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The Coteau du Missouri : A Regional Study

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THE COTEAU DU MISSOURI

A REGIONAL STUDY

BY

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This thesis is approved as a creditable and independent investigation by a candidate for the degree, Master of Science, and is acceptable for meeting the thesis requirements for this degree. Acceptance of this thesis does not imply that the conclusions reached by the candidate are necessarily the conclusions of the major department.

Thesis Advisor Date

Head, Geography Dept. Date

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CHAPTER I

INTRODUCTION

PURPOSE OF THE STUDY

The purpose of this study is to provide a general data base for future studies of and planning for studies of the region. It will also provide the people of South Dakota with information needed to derive a better understanding of the geography of South Dakota. The Department of Geography at South Dakota State University has adopted as a major goal of its graduate program the completion of a series of Master's theses on the geography of South Dakota. Each of these theses will examine the geography of one of the thirteen physiographic divisions that exist within the state (Figure 1). By 1988 studies which have been completed for South Dakota include the Coteau des Prairies, James River Highlands, Lake Dakota Plain, Minnesota River Lowland, and South Dakota Sandhills.[1] These studies can be found

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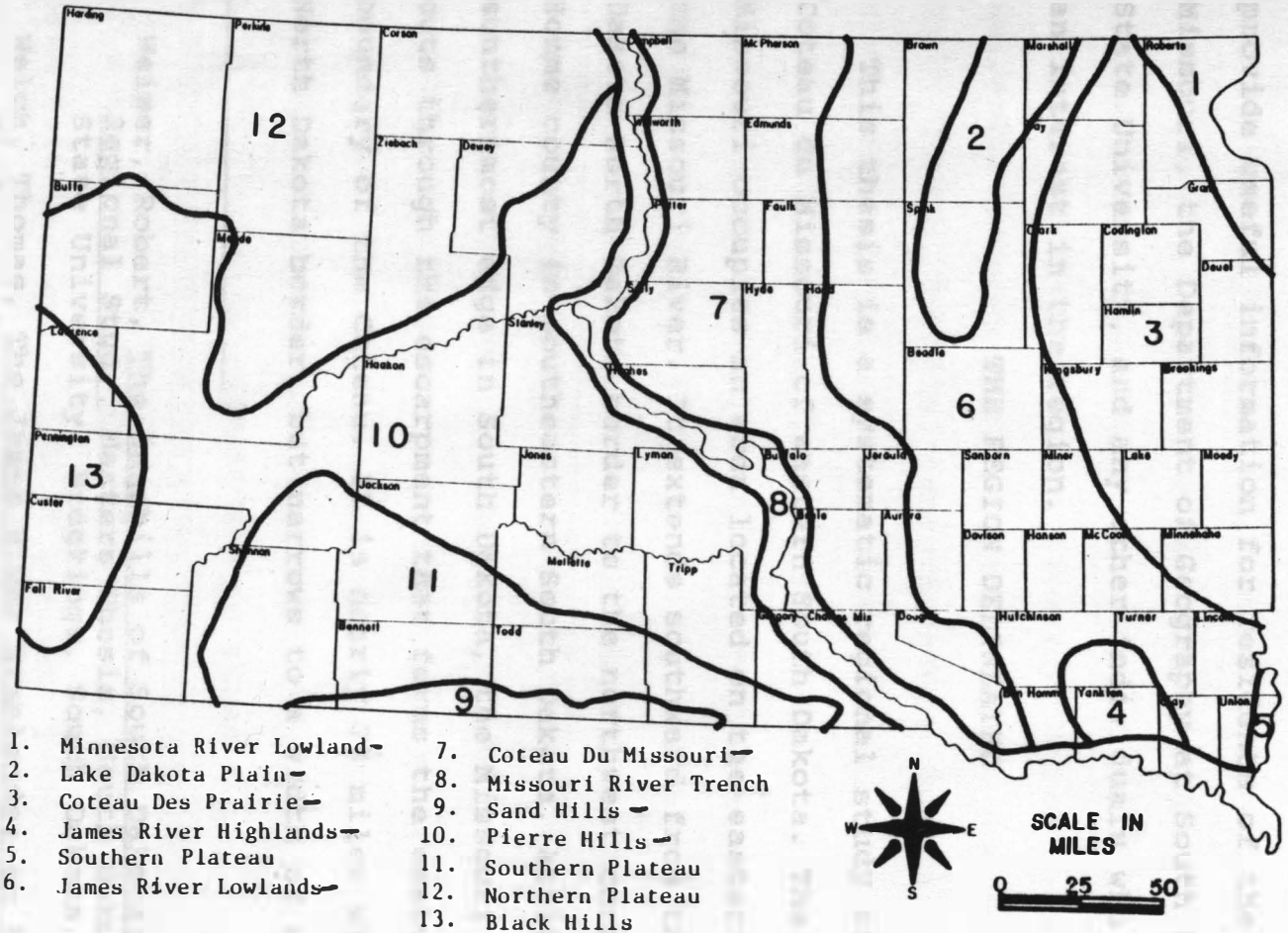
[1]Crawford, Ronald, The Minnesota River Lowland: an Area Study, Masters Thesis, South Dakota State University, Brookings, South Dakota, 1977.

Gab, Orville, The Coteau des Prairies: an Area Study, Masters Thesis, South Dakota State University, Brookings, South Dakota, 1979.

Rumpca, Anselm, The Lake Dakota Plain, Masters Thesis, South Dakota State University, Brookings, South Dakota, 1978.



1. Minnesota River Lowland
2. Lake Dakota Plain
3. Coteau Des Prairie
4. James River Highlands
5. Southern Plateau
6. James River Lowlands
7. Coteau Du Missouri
8. Missouri River Trench
9. Sand Hills
10. Pierre Hills
11. Southern Plateau
12. Northern Plateau
13. Black Hills

Figure 1: Physiographic Regions of South Dakota

Source: Flint, Pleistocene Geology of Eastern South Dakota

in the thesis section of the library at South Dakota State University.

This thesis is conducted with the hope that it will provide useful information for residents of the Coteau du Missouri, the Department of Geography at South Dakota State University, and any other individuals who may have an interest in the region.

THE REGION DELINEATED

This thesis is a systematic regional study of the Coteau du Missouri of eastern South Dakota. The Coteau du Missouri occupies an area located on the eastern side of the Missouri River. It extends southward from the South Dakota-North Dakota border to the northwest corner of Bon Homme county in southeastern South Dakota. At its southernmost edge in South Dakota, the Missouri River cuts through the escarpment that forms the eastern boundary of the Coteau. It is nearly 75 miles wide at the North Dakota border, but narrows to a width of about 25

Weimer, Robert, The Sandhills of South Dakota: a Regional Study, Masters Thesis, South Dakota State University, Brookings, South Dakota, 1985.

Welch, Thomas, The James River Highlands: an Area Study, Masters Thesis, South Dakota State University, Brookings, South Dakota, 1982.

miles at its southern edge in Bon Homme and Charles Mix counties. The Coteau occupies a curving belt of territory 200 miles long in a north-south extent between the Missouri River and the James River Lowland which comprises its eastern boundary (Figure 2).

The Coteau du Missouri includes parts of 19 counties of South Dakota. These counties are Campbell, McPherson, Walworth, Edmunds, Potter, Faulk, Sully, Hughes, Hyde, Hand, Beadle, Buffalo, Jerauld, Brule, Aurora, Charles Mix, Douglas, Hutchinson, and Bon Homme.

The Coteau du Missouri is the western counterpart of the Coteau des Prairies further to the east in South Dakota. It is generally not as high and has a less steep slope than the Coteau des Prairies. The portion of the Coteau du Missouri that extends northward through North Dakota is higher and steeper than the part that lies in South Dakota. The Coteau lacks a well-defined western escarpment, while its eastern escarpment is a subtle one in places and quite obvious in others.

DEFINITION OF TERMS

A region is an area defined on the basis of similar or like features which give it internal unity or homogeneity which in some way distinguishes it from surrounding areas. There are single feature regions based on one

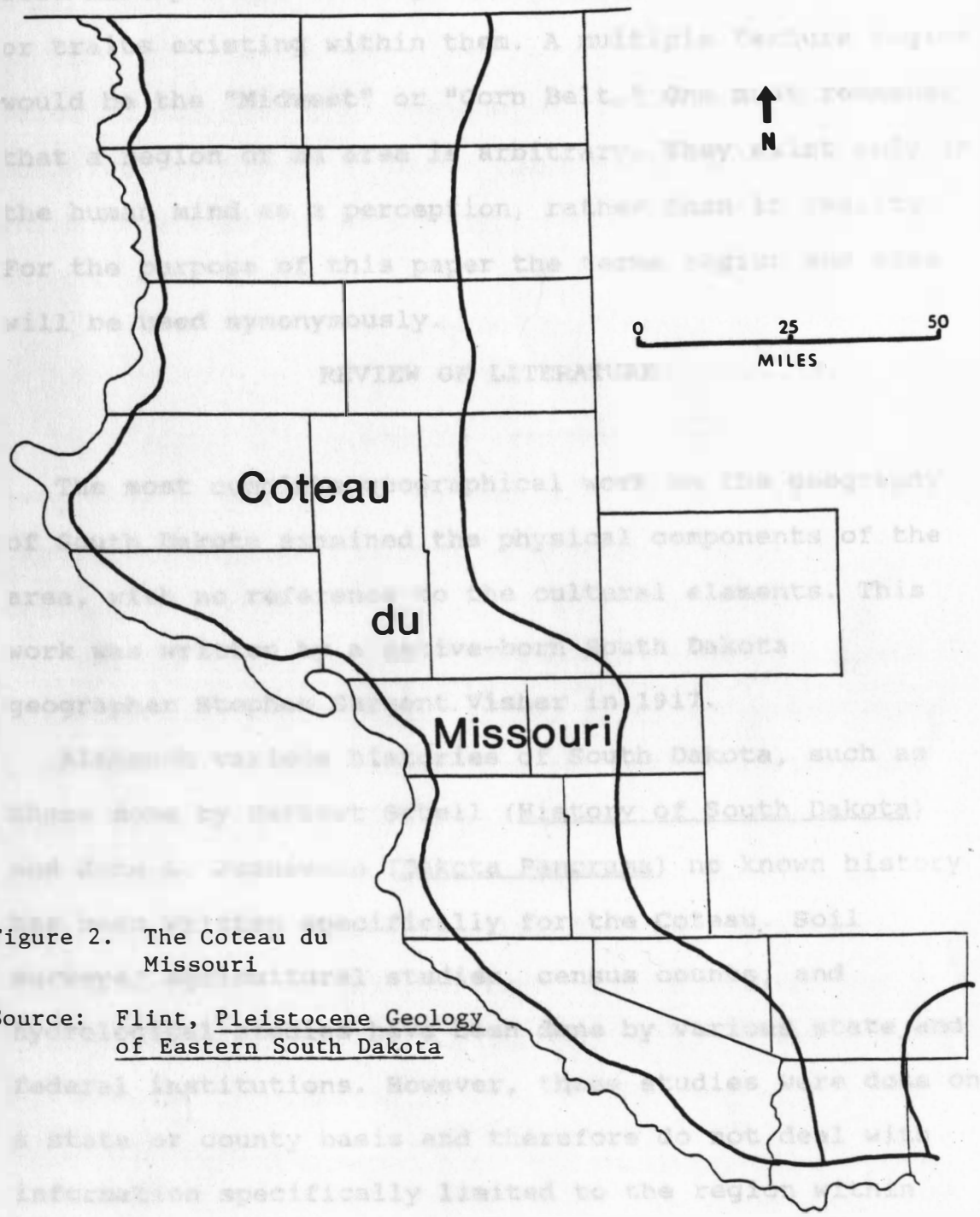


Figure 2. The Coteau du Missouri

Source: Flint, Pleistocene Geology of Eastern South Dakota

feature or trait like climate or landforms. There are also multiple feature regions which have several features or traits existing within them. A multiple feature region would be the "Midwest" or "Corn Belt." One must remember that a region or an area is arbitrary. They exist only in the human mind as a perception, rather than in reality. For the purpose of this paper the terms region and area will be used synonymously.

REVIEW OF LITERATURE

The most complete geographical work on the geography of South Dakota examined the physical components of the area, with no reference to the cultural elements. This work was written by a native-born South Dakota geographer Stephen Sargent Visher in 1917.

Although various histories of South Dakota, such as those done by Herbert Schell (History of South Dakota) and John L. Jennewein (Dakota Panorama) no known history has been written specifically for the Coteau. Soil surveys, agricultural studies, census counts, and hydrological studies have been done by various state and federal institutions. However, these studies were done on a state or county basis and therefore do not deal with information specifically limited to the region within the boundaries of the Coteau du Missouri.

The previously mentioned theses written for the Department of Geography at South Dakota State University provide information about the State, but they are for selected regions. A comprehensive study guide was completed by Edward P. Hogan (Geography of South Dakota) which investigates the physical and cultural elements within South Dakota.

ORGANIZATION

This paper is a systematic-regional study of the geography of the Coteau du Missouri. It utilizes all the traditional criteria needed to provide a complete physical and cultural examination of the geography of the region. Criteria used include the terrain, climate, soils, natural vegetation, animal life, and water which comprise the physical environment. Human occupance and human development comprise the cultural environment of the region. Human occupance deals with the history, while human development investigates the agriculture, transportation, recreation, power and utilities, and cities and towns of the region. The criteria are systematically utilized to examine the geography of the Coteau du Missouri.

CHAPTER II

THE PHYSICAL ENVIRONMENT

The Coteau du Missouri dates back to the days of the French fur traders and trappers who gave the region its name. This region has a unique combination of hills, valleys, and flat land upon which humans have lived to produce what is a part of present day eastern South Dakota. The physical environment is represented by the following features: terrain, climate, soils, natural vegetation, animal life, and water. Together these features represent a detailed view of the physical geography of the geography of the Coteau du Missouri.

Terrain

The Coteau du Missouri is that part of the Missouri Plateau section of the Great Plains which lies east of the Missouri River (Figure 1). Many landform features are the result of glaciers which covered almost the entire eastern half of the state. Meltwaters from these glaciers contributed to the landform formations too by eroding glacial drift and creating streams and valleys (Rothrock, 1943, pp. 34-37).

Prior to glaciation the Coteau was an area of nearly flat bedrock surface that was incised by major streams

flowing east and northeast. Not only did glaciation change drainage patterns, it altered the topography too.

Much of the present day geology of the Coteau exists because of glacial action of the past. Four ice sheets covered parts of the state; they are the Nebraskan, Kansan, Illinoisan, and Wisconsin, with the latter being the most recent. While they all had varying degrees of impact, the features visible at the surface today are from the Wisconsin. This Wisconsin period was the most recent of the Pleistocene epoch, which was of the last Ice Age which ended 10,000 to 15,000 years ago (Flint, 1955, pp. 27-29). All of eastern South Dakota has been glaciated with the exception of four small areas in Charles Mix County.

The Wisconsin ice sheet had four substages, the Mankato, Cary, Tazewell, and Iowan. The Wisconsin ice sheet, as well as the previous three entered the state from the north and east and flowed south and west as can be seen from striations on surface rocks. With them these ice sheets brought glacial till which was deposited when the ice melted. Soils on the Coteau today were formed on this deposition as parent material (Westin and Malo, 1978, p. 10).

The Coteau is underlain by a layer of bedrock below the glacial drift known as Pierre shale. This shale is

firm and compact when dry. It is protected from water, which makes it susceptible to erosion, by the root system of grasses.

Pierre shale is highly erodible because of its composition. It contains a large proportion of clay and a small proportion of quartz along with many layers of bentonite which give poor consolidation thus making it very erodible. When wet the shale absorbs water readily causing it to become a plastic mass which can flow downslope, even on very gentle gradients. This flowed material cracks into small flaky particles which can easily be eroded by wind and water (Flint, 1955, p. 24).

This shale is not the only bedrock present directly under the glacial till. Resistant strata caps the higher parts of the region. Evidence of this exists in several places on the Coteau. In eastern McPherson County, at the North Dakota state line, the surfaces reaches an elevation of more than 2,100 feet above sea level which is 800 feet above the Lake Dakota plain at its base. In this area the plateau is capped by a resistant sandstone overlying the Pierre shale. Other examples of where this occurs are southwest of Miller in Hand County in the Ree Hills and near the southeast corner of Charles Mix County in the Bijou Hills (Flint, 1955, pp 12-13).

The eastern escarpment of the Coteau is marked by a belt of rough glacial hills, known as the Altamount moraine. In the northern part of the region this feature is known as the Bowdle and Lebanon Hills. Elevations of this moraine reach about 2,000 feet above sea level. South of this moraine a 30 mile gap exists where the Coteau blends smoothly into the James River Lowlands and no escarpment can be seen. Then for 75 miles an abrupt escarpment rises 200 feet above the James River Lowlands leaving no doubt as to the Coteau's eastern edge. At its northern edge this rise is known as the Ree Hills (Figure 3), while farther south it is known as the Wessington Hills (Rothrock, 1942, pp. 34-37). At its western edge, which is the Missouri River trench, the Coteau lacks a well defined escarpment blending into the Missouri River breaks.

Thickness of the glacial till on the Coteau is extremely varied. This is because of the irregularity of the bedrock surface beneath it. The glaciers deposited much drift in the low areas and very little in the higher areas of the bedrock. A rough estimate of the till's thickness is 40 feet in eastern South Dakota. Variations are extensive though, some places having only a trace of till while others have depths of hundreds of feet (Flint, 1955, p. 27). The Orient Hills in southern

Figure 3. Coteau du Missouri in the Distance.

Faulk and northwestern Hand County have drift covering them so thick that bedrock exposures have not been found.

The surface as a general rule has less relief than the surface of the bedrock beneath it. Exceptions to this are in the belts of massive end moraines. In general, though, the effect of glaciation has been to reduce local relief. This is particularly true in the two Coteaus in eastern South Dakota.

Less conspicuous than the hills, but no less significant, are several sags which traverse the region in an easterly or northeasterly direction from the Missouri River trench. These sags are features which are lower and much flatter than the surrounding terrain. Some or perhaps all of these features mark the positions of former stream valleys now buried beneath glacial drift.

The most obvious of these sags passes through Hughes, Hyde, and Hand Counties north of the Ree Hills by Ree Heights. This sag, known as the Great Ree Valley, has an elevation of about only 1,750 feet at its highest point (Figure 4). There are four other sags which cross the Coteau but they are less well defined. The first sag crosses the region through southwestern Edmunds and Potter and northeastern Faulk counties. The other three sags are further south. One is in the northern part of Brule and Aurora Counties, a second leads eastward across

Figure 4. Great Ree Valley.

northern Douglas county and a third, trending northeast, crosses eastern Charles Mix county and southeastern Douglas county. These sags have poorly defined lateral margins because both low areas and upland have been covered with glacial drift one or more times. Because of these poorly defined lateral margins the sags merge smoothly into the upland across which they lie (Flint, 1955, p. 13).

On the Coteau, drainage is mostly symmetrical. On the eastern slope the region drains into the James River through short nearly parallel streams. The western part has a more irregular stream pattern and drains toward the Missouri. In the northern part there is a large area where the drainage is interior. In this area runoff drains into the many local depressions in the glacial drift. Isolated places here and there throughout the entire Coteau have interior drainage, but it is much less common in the southeastern part than in the northern. The southeastern part of the Coteau has more slope making drainage into the rivers easier. It also has a moister climate which results in greater runoff causing a more vigorous erosion by small seasonal steams (Flint, 1955, p. 13).

Despite today's seemingly simple pattern, drainage on the Coteau has had a complex history. Now some streams

flow in opposite directions to those of streams which used to occupy the same aerial positions. This was caused by glaciation, the result of which changed drainage from an east and north direction to the present day pattern of west and south (Flint, 1955, p. 13).

Climate

Physical conditions of an area are influenced by climate. The climatic elements that influence the environment include radiation, winds, heat, barometric pressure, humidity, cloud cover, evaporation, precipitation, and the passage of frontal systems. Because of the size and relief of the Coteau du Missouri, there are only slight variations in the climate within the region.

South Dakota has a continental climate because of its interior location in North America. Summers are typically hot and dry while winters are cold. Precipitation is limited and unreliable.

The Coteau has three climate types (Figure 5). The southern portion is Humid Continental "A" which has winter temperature averages of 18 to 26 degrees fahrenheit and summer average temperatures between 71 to 75 degrees fahrenheit. The northern and eastern portion is Humid Continental "B". Here winter temperatures

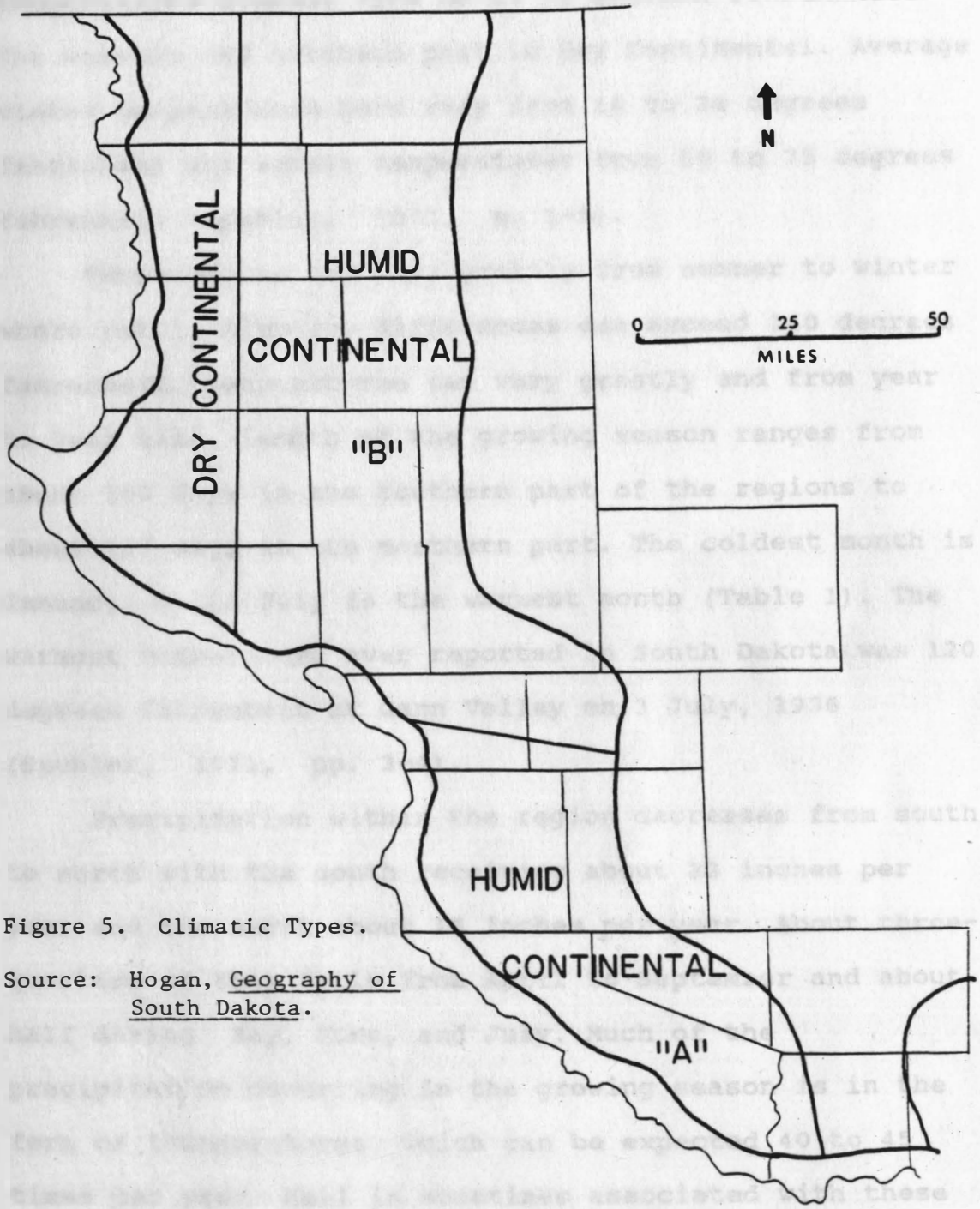


Figure 5. Climatic Types.

Source: Hogan, Geography of South Dakota.

average from 13 to 19 degrees fahrenheit and summer temperatures average from 68 to 72 degrees fahrenheit. The western and northern part is Dry Continental. Average winter temperatures here vary from 16 to 26 degrees fahrenheit and summer temperatures from 65 to 75 degrees fahrenheit (Spuhler, 1971, p. 3-5).

Temperatures can vary greatly from summer to winter where yearly high-low differences can exceed 140 degrees fahrenheit. Temperatures can vary greatly and from year to year also. Length of the growing season ranges from about 143 days in the southern part of the regions to about 137 days in the northern part. The coldest month is January, while July is the warmest month (Table 1). The warmest temperature ever reported in South Dakota was 120 degrees fahrenheit at Gann Valley on 3 July, 1936 (Spuhler, 1971, pp. 3-4).

Precipitation within the region decreases from south to north with the south receiving about 22 inches per year and the north about 18 inches per year. About three-quarters of this falls from April to September and about half during May, June, and July. Much of the precipitation occurring in the growing season is in the form of thunderstorms, which can be expected 40 to 45 times per year. Hail is sometimes associated with these thunderstorms, and may be expected to occur generally in

Table 1

Selected temperature data for the Coteau du Missouri

Station	Average January Temperature		Average July Temperature		Average Seasonal Temperature	
	Fahrenheit	Celsius	Fahrenheit	Celsius	Fahrenheit	Celsius
Eureka	8.1	-13.3	71.2	21.8	40.3	4.6
Gettysburg	11.4	-11.4	72.8	22.8	NA	NA
Highmore	NA	NA	74.0	23.3	NA	NA
Gann Valley	13.1	-10.5	74.7	23.4	47.5	8.6
White Lake	14.9	- 9.5	76.3	24.0	48.8	9.3
Wagner	17.8	- 7.9	78.4	25.1	50.7	10.4

Source: U.S. Department of Commerce, National Climatic Center, Climatological Data Annual Summary: South Dakota 1986, pp. 3-5.

most parts of the state two or three times a year on the average (Spuhler, 1971, p. 4).

It is quite common for precipitation to vary greatly from year to year. This makes drought a real factor in the region as precipitation is already marginal for many crops. There can be a large variation of yearly snowfall, but the Coteau gets between 30 to 40 inches on the average. Snow which falls early or late in the season usually melts within a few days. This is because of the mild fall and spring temperatures that occur in a plains region. This limits the time that the ground is actually covered with snow during the winter.

Snow accompanied by high winds can produce blizzards, which have occurred in South Dakota from the middle of October until early May. Blizzards are winter storms with wind speeds of at least 35 miles per hour, considerable falling and or blowing snow, and temperatures of 20 degrees F or lower (CES, n.d., p. 1). This blowing and drifting of snow can block roads and make winter travel hazardous. Blizzards can be expected to occur one or more times a year.

One blizzard, known as the "children's blizzard" struck 12 January, 1888. Though this storm lasted little more that 12 hours it caused great loss of human life and livestock. Bon Homme, Beadle, and Hutchinson counties

combined for 52 human lives lost (Karolevitz, 1975, p. 176).

Prevailing winds in the region are from the north or northwest in the winter, and from the south or southeast in the summer. The strongest winds are associated with periods of thunderstorm activity and the passage of cold fronts during the winter (Spuhler, 1971, p. 3). The average annual wind speed is approximately 11 miles per hour.

A considerable amount of sunshine and clean air are common in the region. Because of a generally low humidity cloudy days are few. The average number of clear days per year in South Dakota is 173 with 104 days partly cloudy and 88 cloudy days. The sun shines about 62 percent of the time in the state, with low humidity and considerable air movement this makes for excellent visibility (Spuhler, 1971, p. 4).

Soils

The interaction of five soil forming factors are recognized by soil scientists as being primarily responsible for the type of soil that develops in an area. These primary factors are: biological activity, climate, parent material, time, and topography (Westin and Malo, 1978, p. 9). Climate is generally considered

to be the most important of these factors. To a large extent it influences the characteristics of the native vegetation and is important in the weathering of parent materials into the soil and the erosion of soils already formed.

Vegetation influences nutrients, organic matter content, and the color of the surface. Types of vegetation and their distribution are influenced by climate. The native vegetation of the Coteau du Missouri was mid and short grass prairie in the south and short and mid grass prairie in the north. Together vegetation and climate are often called the active factors of soil formation.

Native vegetation along with temperature determined the original amount of organic matter in the soils. Rapid decomposition of organic matter is the result of high summer temperatures in the south part of the Coteau, while in the north the cooler temperatures allow for a higher organic matter content.

Climate also helps affect the depth of carbonate leaching, which is greater when temperatures are higher and moisture is greater. In the northern part of the region there is less leaching of carbonate because of cooler temperatures and less precipitation, while the southern part has higher temperatures and more

precipitation causing leaching to a greater depth making for a thicker more fertile soil.

Parent materials determine the texture and mineralogical composition of soils. The parent materials found on the Coteau du Missouri is mainly glacial till (Figure 6). This parent material is determined by character and structure of preglacial materials. This is because most glacial deposits consist of altered rocks of local origin. Other parent materials are loess, alluvium, and colluvial materials. Most of the parent material from which the soils of the Coteau formed is from the late Wisconsin glacial till but some is from early Wisconsin till.

Time is important in the formation of a soil. If the materials are easily eroded by wind and water, steep slope soil is destroyed almost as fast as it is formed. In flat slopes destructive processes are slowed by vegetation which allows deeper soils to develop (Westin and Malo, 1978, p. 12).

Soils on the Coteau are of two types, Chernozem and Chestnut (Figure 7). Chernozem soils are found in layers or horizons and are rich in organic matter and calcium which makes them black. The layers which lie underneath are lighter in color. These soils developed in steppe grasslands and prairies. Chernozem soils are found all

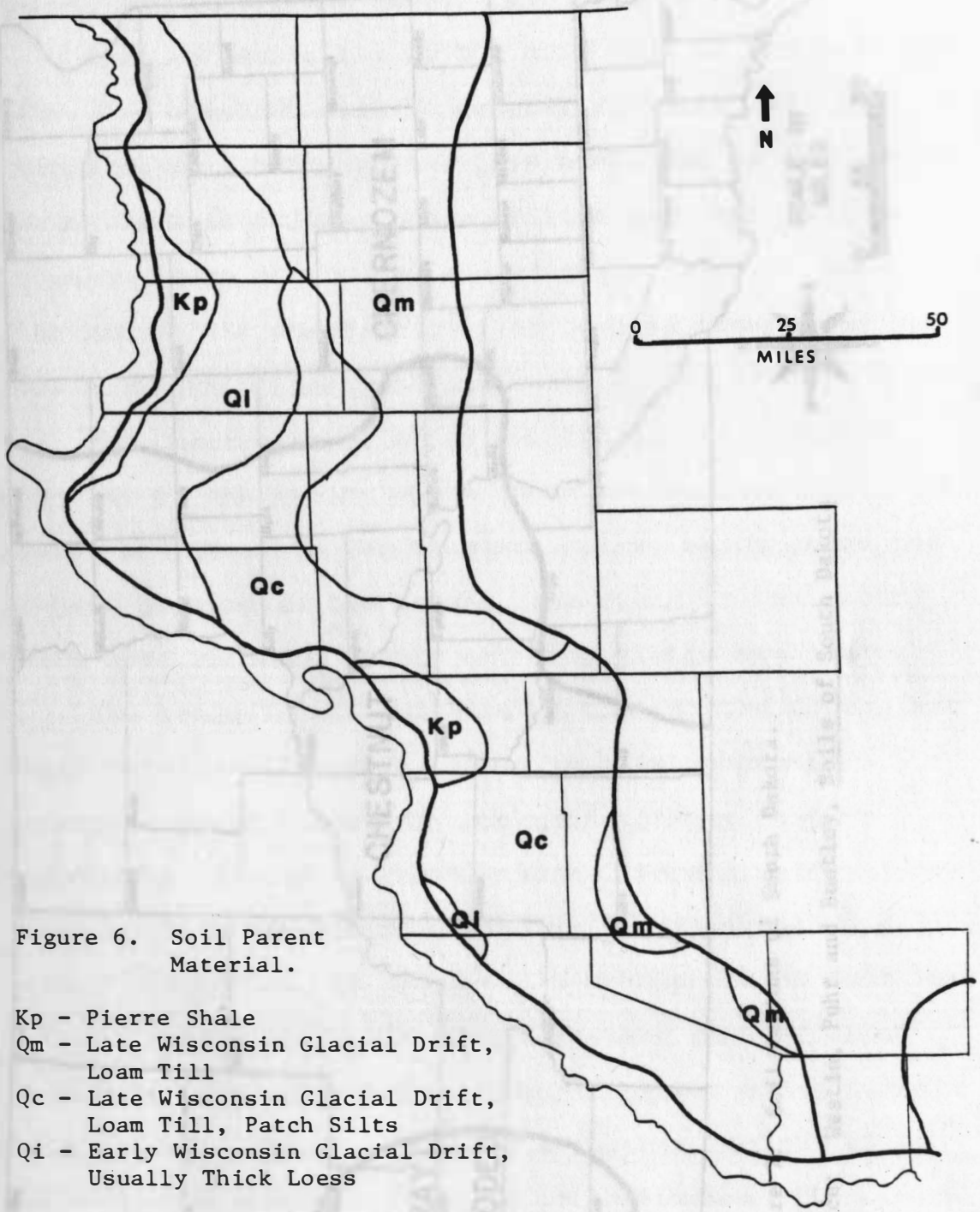


Figure 6. Soil Parent Material.

Kp - Pierre Shale
Qm - Late Wisconsin Glacial Drift, Loam Till
Qc - Late Wisconsin Glacial Drift, Loam Till, Patch Silts
Qi - Early Wisconsin Glacial Drift, Usually Thick Loess

Source: Westin, and Malo, Soils of South Dakota.

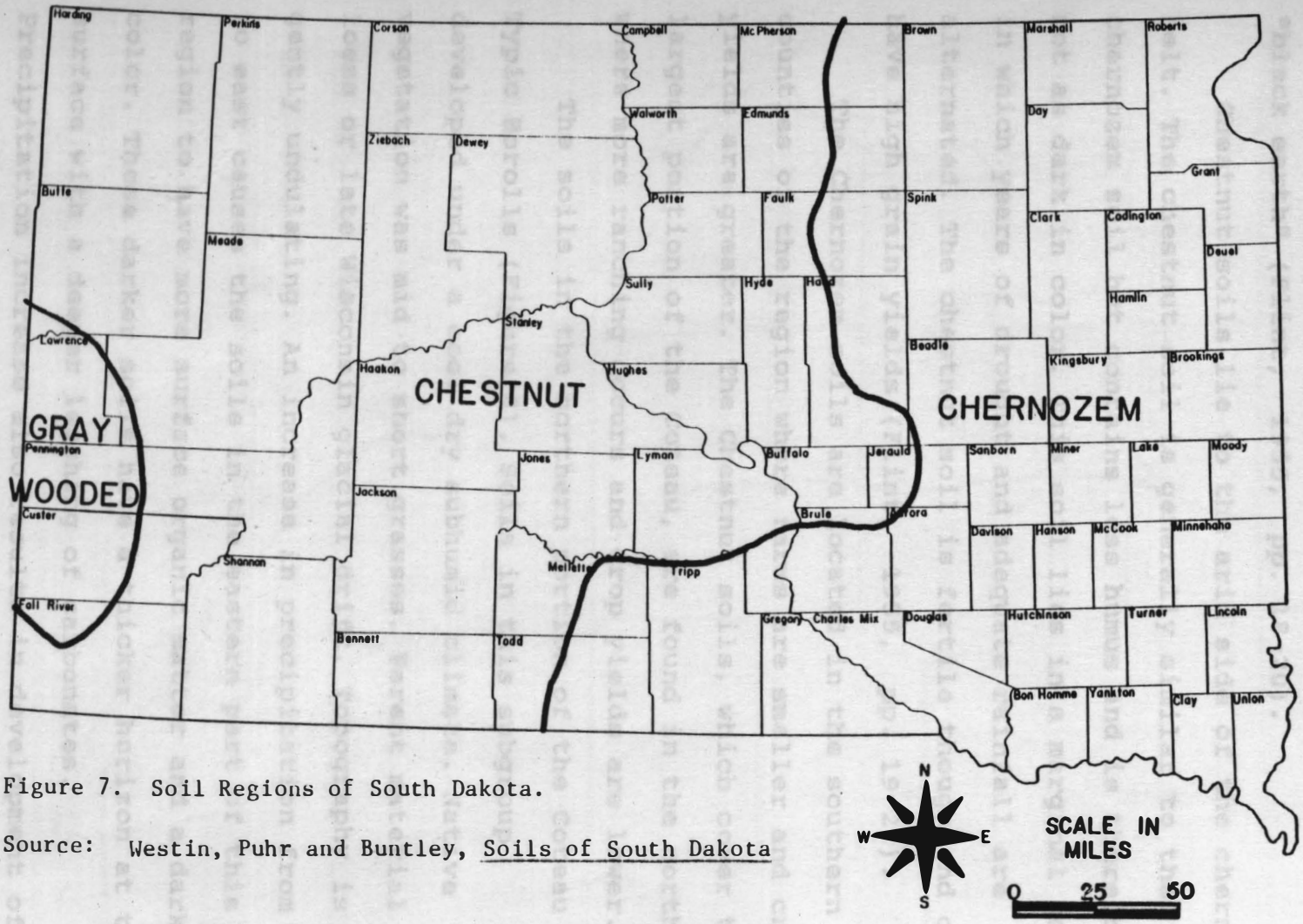


Figure 7. Soil Regions of South Dakota.

Source: Westin, Puhr and Buntley, Soils of South Dakota

over the world. Chernozem is from the Russian word for "black earth" (Flint, 1955, pp. 18-20).

Chestnut soils lie to the arid side of the chernozem belt. The chestnut soil is generally similar to the chernozem soil but contains less humus and is therefore not as dark in color. This soil lies in a marginal belt in which years of drought and adequate rainfall are alternated. The chestnut soil is fertile though and can have high grain yields (Flint, 1955, pp. 19-20).

The Chernozem soils are located in the southern counties of the region where farms are smaller and crop yields are greater. The Chestnut soils, which cover the largest portion of the Coteau, are found in the north where more ranching occurs and crop yields are lower.

The soils in the northern portion of the Coteau are Typic Borolls (Figure 8). Soils in this subgroup developed under a cool dry subhumid climate. Native vegetation was mid to short grasses. Parent material was loess or late Wisconsin glacial drift. Topography is gently undulating. An increase in precipitation from west to east causes the soils in the eastern part of this region to have more surface organic matter and a darker color. These darker soils have a thicker horizon at the surface with a deeper leaching of carbonates. Precipitation increase also results in development of a

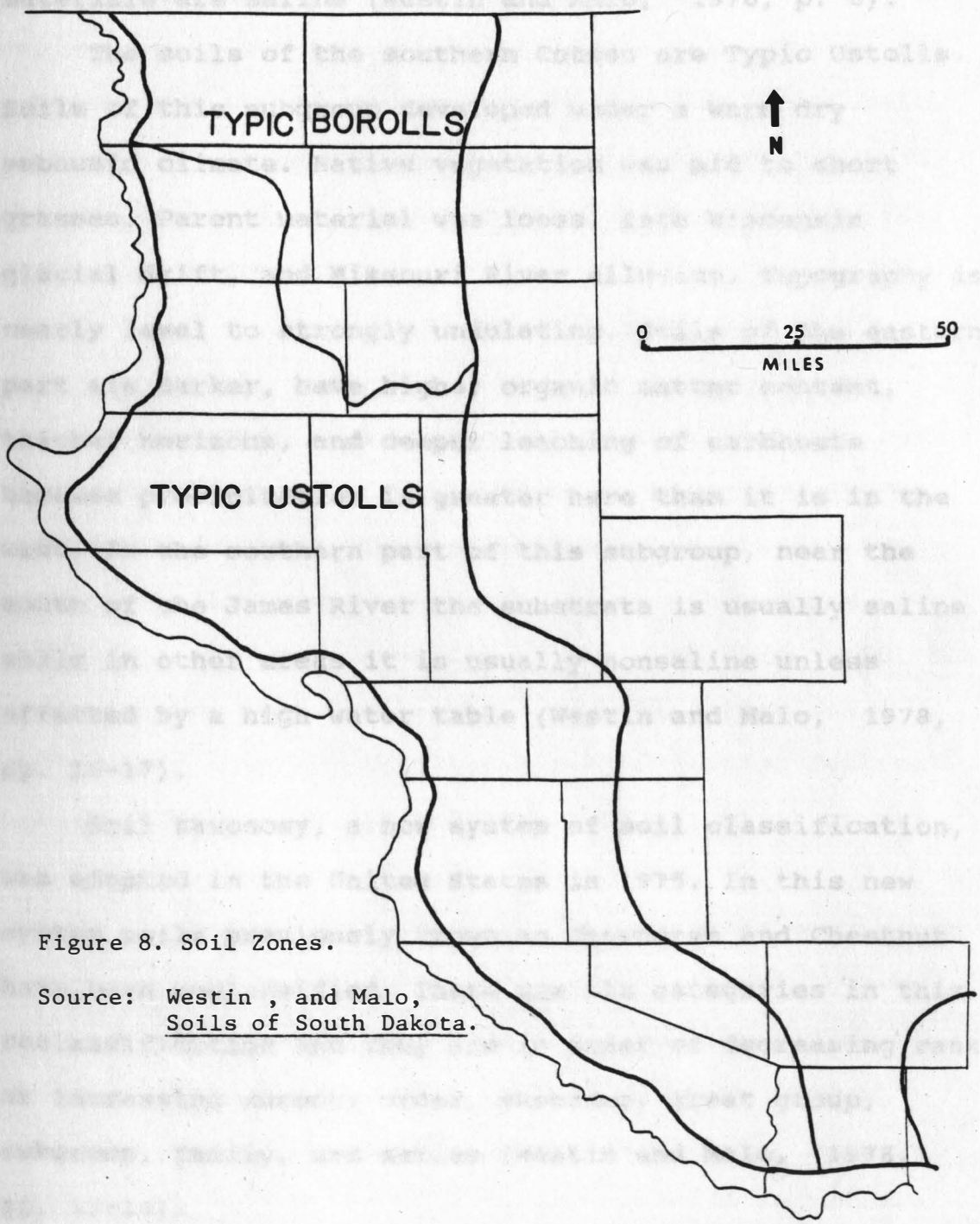


Figure 8. Soil Zones.

Source: Westin , and Malo, Soils of South Dakota.

salt horizon below the carbonate horizon where parent materials are saline (Westin and Malo, 1978, p. 6).

The soils of the southern Coteau are Typic Ustolls. Soils of this subgroup developed under a warm dry subhumid climate. Native vegetation was mid to short grasses. Parent material was loess, late Wisconsin glacial drift, and Missouri River alluvium. Topography is nearly level to strongly undulating. Soils of the eastern part are darker, have higher organic matter content, thicker horizons, and deeper leaching of carbonate because precipitation is greater here than it is in the west. In the southern part of this subgroup, near the mouth of the James River the substrata is usually saline while in other areas it is usually nonsaline unless affected by a high water table (Westin and Malo, 1978, pp. 16-17).

Soil taxonomy, a new system of soil classification, was adopted in the United States in 1975. In this new system soils previously known as Chernozem and Chestnut have been reclassified. There are six categories in this reclassification and they are in order of decreasing rank or increasing number: order, suborder, great group, subgroup, family, and series (Westin and Malo, 1978, pp. 13-14).

The pattern of soils on the Coteau is a mixture of

two or more soil types. The soil changes locally with each change in relief or parent material. On a regional basis climate and vegetation influence soil. These soil patterns are called soil associations (Westin and Malo, 1978, p. 20). Classifying soil in this manner allows a soil to be used to grow crops which will adapt to that particular association.

Natural Vegetation

South Dakota lies within the central lowlands region of the North American continent where the predominant vegetation is grass. The vegetation of the region was directly influenced by the soil and climate. These conditions are what determine, along with fire, which has been a factor too, the type of vegetation that can survive and prosper. Little natural vegetation remains because of the high agricultural activity which takes place in the Coteau.

The Coteau du Missouri is a transitional area in the state for native vegetation with a mixture of various types. There is a tall grass prairie region located in the southern portion of the Coteau while the northern portion is mixed grass (Figure 9). While lines have been drawn to delineate grassland areas there is actually a zone of transition between the different areas. There are

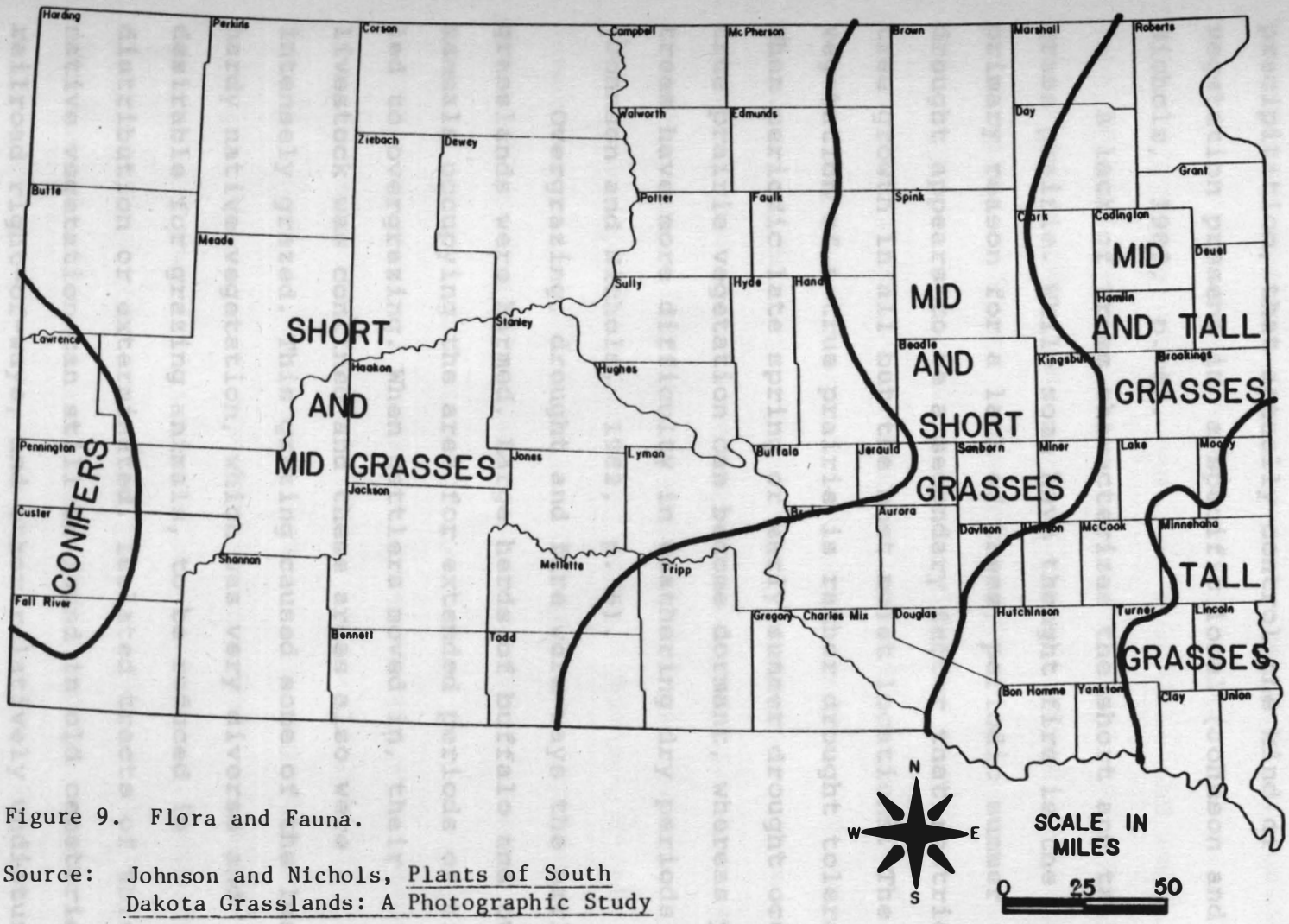


Figure 9. Flora and Fauna.

Source: Johnson and Nichols, Plants of South Dakota Grasslands: A Photographic Study

a multitude of environmental factors, other than precipitation, that actually control the kind of vegetation present in a specific local (Johnson and Nichols, 1982, p. 6).

A lack of trees characterizes the short and tall grass prairie. While some have thought fire is the primary reason for a lack of trees, periodic summer drought appears to be a secondary factor that restricts tree growth in all but the most moist locations. The vegetation of a true prairie is rather drought tolerant. When periodic late spring or early summer drought occur, true prairie vegetation can become dormant, whereas young trees have more difficulty in weathering dry periods (Johnson and Nichols, 1982, p. 6).

Overgrazing, drought and fire were ways the early grasslands were harmed. Large herds of buffalo and other mammals occupying the area for extended periods of time led to overgrazing. When settlers moved in, their livestock was confined and these areas also were intensely grazed. This grazing caused some of the less hardy native vegetation, which was very diverse and desirable for grazing animals, to be reduced in distribution or exterminated. Isolated tracts of this native vegetation can still be found in old cemeteries, railroad right-of-ways, and other relatively undisturbed

plots.

Native grasses which are overgrazed or are damaged by fire or drought are replaced by less desirable but hardier grasses. These are less palatable and generally less productive than the grasses they replace. These less desirable grasses include Kentucky bluegrass, western wheatgrass, sideoats grama, blue grama, hairy grama, buffalograss, and panic grasses. Some of the more common forbs that increase are yarrow, cudweed sage, whorled milkweed, many-flowered aster, skeltonweed, and some goldenrods. Further deterioration leads to another group of plants becoming increasingly abundant and these are referred to as invaders. These invaders include cheatgrass, prairie threeawn, foxtail barley, Canada bluegrass, and sand dropseed. Weedy forbs include ragweeds, perennial thistles, and curlycup gumweed among others (Johnson and Nichols, 1982, p. 6).

In its natural condition true prairie vegetation contains many species. The major grasses include big bluestem, little bluestem, indiangrass, switchgrass, porcupine grass, prairie dropseed and tall dropseed. Some principle forbs include leadplant, milkvetch, groundplum, American licorice, white and purple prairie clover, the scurfpeas, onions, pussytoes, black sampson, perennial sunflowers, false bonnet, and prairie rose. This native

vegetation is extremely productive, palatable, and nutritious (Johnson and Nichols, 1982, p. 6).

The tall grass species found in the southern portion of the Coteau are big bluestem, switchgrass, and Indiangrass. Big bluestem is a large plant with seed stalks reaching three to eight feet in height. It has a bluish color and the seed heads frequently branch out into three parts which resemble a turkey's foot. It is probably the most palatable grass in South Dakota, and produces a large quantity of forage too. Little bluestem is much like big bluestem except that it is only one to four feet tall, has slightly flattened leaf sheaths, and folded leaves (Johnson and Nichols, 1982, p. 13).

Switchgrass reaches a height of three to six feet. It has V-shaped patches of hair on the upper surface of the leaf blade near the stem. While not as palatable as big bluestem it is readily consumed by livestock as long as the stems remain green. Indiangrass grows from four to eight in height and has golden yellowish, lance shaped dense panicle. It is used as feed for cattle and is of excellent quality.

The mid and short grasses in the Coteau are western wheatgrass, and porcupine grass. Western wheatgrass, which is the state grass, has generally blue-green stems and leaves. The leaves are stiff, flat when green, rolled

when dry and feel rough to the touch. This native, cool season grass is palatable and nutritious when green. Porcupine grass is a cool season grass which has decreased under grazing pressure. It is seldom a major component of the vegetation today except in isolated tracts. It is very nutritious and relished by all livestock.

The short grass species found in the northern part of the region are buffalograss, bluegrama, and little bluestem. Buffalograss is a native warm season invader. While it can produce an abundant amount of forage, it provides very little production. Under heavy grazing pressure this grass will increase. Buffalograss is grazed by all classes of livestock at all seasons. Blue grama reaches from 10 to 20 inches in height at the seed heads. It is easily identified by its seed heads which resemble a human eyebrow. Although normally low in productivity it is nutritious and palatable to all classes of livestock.

As grazing and cultivation of land became more intensified the native grasses were reduced in area or eliminated. Today more than 75 percent of the land in eastern South Dakota is under cultivation. Natural vegetation is limited on the Coteau as most of the vegetation is of various crops. Present day grasses in the region are less desirable than the native vegetation

that once covered the Coteau.

Animal Life

Since the white man's arrival on the Coteau, animal life has changed. Some animal numbers have decreased while some species have been eliminated altogether. This slaughter of large wild animals is from our inherent greed to kill as well as from an economic point of view. Buffalo which roamed the prairies in the millions were pushed to the brink of extinction by hunters whose only motivation was sport killing or economic return as in many cases only the tongue and hides were taken. Other wildlife such as elk, deer, and antelope were threatened, and the elk are now gone (Over and Churchill, 1941, pp. 1-2).

Buffalo are the animals most associated with the plains states. Today their numbers are limited in the state. The buffalo once was a very important source of meat to the Indians, early explorers, and settlers.

Elk once inhabited South Dakota. Up to 1870 these animals occupied the whole state, but were concentrated along streams and around lakes. Killing of these animals by white men reduced their numbers in the Coteau and the remaining animals migrated to the remote regions of the mountains to the west.

Mule deer, largest member of the deer family, once roamed the entire state. This animal was largely driven from the region by settlers hunting for meat and the change in habitat brought on by farming. With restricted hunting seasons and proper game management their numbers in the Coteau have increased. The mule deer are now found in the remote hilly regions of the Coteau. The white-tailed deer which once inhabited the entire state, was nearly driven to extinction, but it has rebounded in sufficient numbers that in some parts of the Coteau they have become a nuisance. These animals were an important source of meat and buckskin to Indians and settlers. They are now an important recreational resource in the region as well as providing meat for hunters.

The antelope once roamed the state in large numbers, and was a good source of meat for humans. Today these animals inhabit the Coteau in remote grassland areas in limited numbers.

Many smaller mammals exist in the region. The more common ones are rabbits, pocket gophers, shrews, mice, and ground squirrels. These animals have no specific habitat and usually are found everywhere. They feed on vegetation, both native and cultivated, eating roots, leaves, and plant stems. Mice will eat about anything including insects. Rabbits can cause considerable damage

in the winter by eating bark and buds from trees. Pocket gophers compete with livestock for vegetation, but their real destructive quality is their digging of holes or burrows.

Many types of small birds inhabit the Coteau. Common ones include swallows, robin, western meadowlark, sparrows, common crow, starlings, red-winged black bird, warblers, woodpeckers, and finches. Most of these birds eat weed seeds and insects which makes them a valuable asset to the region. Woodpeckers extract insects and larva that would destroy our trees. The english sparrow is destructive though. They feed their young on insects, but otherwise they eat only grain.

The most common scavenger birds are hawks and owls. While most people associate these birds as being bad, perhaps no other class of birds is of greater economic value to our agricultural interest. They eat mice, gophers, and larger insects, such as grasshoppers and crickets, which destroy untold dollars worth of crops every year (Over and Thomas, 1946, p. 117).

Gamebirds are important to on the Coteau. These birds provide recreation and meat for the outdoorsman. They also attract many hunters to the region who spend money which helps the general local economy. Farmers benefit more than they realize by having these birds

around, since they eat weed seeds and insects. This helps prevent crop loss and improve yields. Common game birds include morning dove, bobwhite quail, prairie chicken, prairie sharp-tailed grouse, gray partridge, and the ring-necked pheasant which was introduced in South Dakota in the early 1900's.

While some waterfowl do live in the Coteau, they mainly migrate through the region. In the fall when flying south for the winter these birds stop in the area and are hunted. Waterfowl that at times are found in the coteau are mallard, pintail, blue-winged teal, and green-winged teal ducks, and coots; additionaly, there are and canada geese, snow geese, and blue geese.

Another type of animal found in the Coteau is the furbearer. Included in this group are mink, raccoon, coyote, red fox, badger, muskrat, weasel, and striped and spotted skunks. These animals are sought by professional and amateur trappers alike and they have considerable economic value. Factors which limit their numbers are loss of habitat, competition with humans, and weather conditions. Farming the land and draining of lowlands can have adverse effects on the furbearers but they usually adapt to the disruption of their habitat by humans.

Water

The lack of adequate water in the Coteau has been a problem that all people who inhabited the region have encountered throughout time. There are no rivers or major streams that flow through the Coteau. The Missouri River parallels the region on the west and the James River parallels on its east side. While these two rivers are close to the region, it receives no real benefits from them. The surface water features that are found in the Coteau are mainly natural and artificial lakes, and stockponds. Several creeks are found in the region. Those help drain excess water in wet years, but in other years they do not flow at all.

Some of the lakes that exist in the Coteau are of glacial origin. These natural lakes were formed when residual blocks of glacier ice became wholly or partly buried in the drift and after melting created the basins which are now lakes. The great majority of these basins seem to be related to former steam valleys partly blocked or largely buried by glacial drift (Flint, 1955, p. 67).

Some lakes exist in the region because streams have been dammed up since the drought period of the 1930's. This was done to conserve the usually short water supply so that during dry periods the region would have a supply

of water for various uses. Both these natural and artificial lakes vary in size, shape, and depth (Table 2). The levels of these lakes fluctuate seasonally and over a period of years. Lakes of the Coteau generally are more saline than are lakes located farther east in South Dakota. This is a result of less precipitation and more evaporation, and as a result water quality is not as good (Flint, 1955, p. 17).

Stock ponds and dugouts are quite numerous throughout the region. These are used to store water for livestock use on farms and ranches. Dugouts are usually small in size and are constructed in low depressions of pastures where water may be stored by collecting spring snowmelt, early summer runoff, and ground water seepage. These dugouts are simply excavated areas in the ground. Stockponds are similar to dugouts and are used to collect and store surface water for agricultural use. A stockpond is formed by a dam across a natural waterway or drain. Some type of spillway is provided to protect the structure from being washed out by severe runoff. These dugouts and stockponds were constructed after the 1930's to provide a source of water during dry periods (SDSGS, 1964, p. 252).

Groundwater is found throughout the area in shallow aquifers. These aquifers are from deposits left by

Table 2

Lakes over 100 acres in size

Lake	Size (acres)	(located in)
Andes Lake	6,400	Charles Mix
Arikara Lake	160	Hughes
Bedashosha Lake	487	Buffalo
Blue Blanket Lake	5,200	Walworth
Colvin Lake	160	Brule
Cottonwood Lake	320	Jerauld
Cottonwood Lake	320	Sully
Crow Lake	640	Jerauld
Matzke Lake	100	Campbell
McClarem Lake	240	Campbell
Molstad Lake	121	Walworth
Mud Lake	320	Brule
Pembroke Lake	320	Potter
Platte Lake	1,000	Aurora
Potts Lake	100	Potter
Sully Lake	500	Sully
White Lake	1,700	Aurora
Woodruff Lake	104	Hughes

Source: Work Projects Administration, South Dakota Place-Names, Part II Lake Names, University of South Dakota, Vermillion 1940.

glaciers or from alluvial deposits of the meltwaters. They tend to follow old stream beds that the ice sheets filled in with till. They are irregular in size and shape and are of varying thickness. The amount of water in these aquifers varies greatly. They provide a reliable source of water except in extended years of dry conditions. When this happens these shallow aquifers can have a lowered water table, as they are dependant upon surface moisture to replenish them. The quality of this water tends to be good.

Bedrock aquifers have a larger more reliable supply of water, but these are much deeper as wells can be 1,000 or more feet deep to reach their water. These bedrock aquifers cover greater areas than do glacial aquifers and produce much more water for the region. These artesian wells are found throughout the region. They usually are free-flowing because of the great pressure put upon them by the geologic formations above them. The quality of their water is usually poor. It is highly mineralized and often contains undesirable elements.

Recharge of these aquifers is important to the people who depend on them. Shallow aquifer recharge is mostly from precipitation which falls in the region and percolates its way down from the surface. Recharge also is provided by surface water which relocates down to the

aquifer, and lateral flow of underground water into an aquifer. Bedrock aquifer recharge is from the Rocky mountains out west. Meltwater and rainwater percolates into the bedrock formations and in time arrives underneath the Coteau, where it is available to humans from the artesian wells.

Flooding is not much of a problem in the Coteau. The greatest threat is during springtime when snows melt in the region. Heavy rains can cause some localized flooding too. The topography is such that this meltwater and rainfall are usually drained away with a minimal number of problems for the people.

The elements mentioned in this chapter combine to produce the physical environment of the Coteau du Missouri on which humans live. The people living in the Coteau utilize these physical elements to help produce the cultural environment that they use in the region that they inhabit.

CHAPTER III

HUMAN OCCUPANCE

In a study such as this it is essential that the human element is examined to understand its effect on the geography of the Coteau du Missouri. Economic, demographic, and historical influences are elements as essential to the geography of the region as are the physical features. Human effect on the environment, whether planned or not, can alter or change the natural landscape.

While studying the human occupance of any region it is important that that region be viewed as a part of the whole. The state's history needs to be examined to understand the basic influence that humans have had on any of its divisions.

There are many theories concerning how early man entered the "New World." However humans reached North America, it is believed these people arrived about 40,000 years ago. During this period and up until about 4,500 years ago, those Indians residing in the New World are referred to as "Paleo-Indians" (Driver, 1969, pp. 3-6).

These early Americans were nomadic hunters and gatherers. No domesticated animals such as the dog or horse are known to have been used by these Indians. Their

major means of subsistence were the now extinct long horned folsom bison, plains elephant, giant beaver, musk ox, and mastodon. They also ate elk, antelope, and lush vegetation. Tools these Indians used were fluted projectile points, sharpened stone scrapers, and knives. (Satterlee and Malan, 1973, p. 5).

After the migrations of Paleo-Indians throughout the plains regions there arrived a new group of people referred to as Mound Builders. Their arrival on the plains was about 500 A.D. This group of people was thought to have originated from the fertile river valleys of Ohio, Indiana, and Illinois. These new inhabitants of the plains combined hunting and gathering features with incipient agriculture, which was in contrast with the earlier residents. They raised corn, beans, and squash on the fertile plains of numerous rivers. These new inhabitants of the plains were more sedentary than the earlier Indians. The Mound Builders had villages which were more permanent with their housing comprised of earthen lodges. Their tools consisted of bone awls, fishhooks and needles. The tools they used for agricultural practices were hoes made from bison shoulder blades and bison ribs. Weapons used included bows and arrows, grooved stone hammers, ax heads, and bone knives (Schell, 1968, pp. 15-16).

These people, as their name implies, built burial mounds (Figure 10). These mounds ranged in size from 60-120 feet in diameter and 5-10 feet in height. They were not only burial chambers, they also served as caches of food and weaponry. Their villages consisted of about 10 earthen rectangular lodges up to 25 feet in diameter. This housing contained fireplaces and pits where food was stored. The Mound Builders disappeared from the plains area about 800 A.D. probably because they were either annihilated in warfare or assimilated by other groups (Schell, 1968, p. 16).

After the disappearance of the Mound Builders the next group to inhabit the region was the pre-Arikara. They migrated out of southern Minnesota to present day South Dakota from 1250 to 1400 A.D. These people are thought to be the ancestors of the Mandan or Arikara Indians (Schell, 1968, p. 16). While the pre-Arikara lived all over the region one particular site contained 200 to 300 earth lodges with a population of up to 5,000 people. Because of the size of this village they possessed some degree of civilization to feed, govern and provide sanitation for a community this size. This was Fort Sully Village which was located 30 miles north of Pierre. Another pre-Arikara village was Mush Creek Fortress located eight miles east of Pierre on Highway

Figure 10. Indian Burial Mounds.

34. This village dates back to the time of Columbus or before. It covered some 50 acres and had a defense system of a palisade and moat, and numerous bastions, and has been considered equal to similar structures in Europe at that time (Jennewein and Boorman, 1973, pp. 2-3).

The next group of Indians to reside in the region was the Arikara or Ree. These Indians were concentrated along the western edge of the Coteau near the Missouri River. They migrated from present day Nebraska and Kansas during the 16th century. These Indians were agriculturists who depended mainly on corn, beans, squash, and pumpkins, which were supplemented by buffalo and small game. The Arikara introduced the horse to the upper Missouri Valley. The Arikara were a prominent feature in South Dakota until their numbers were reduced by several small pox epidemics near the end of the 18th century. A new arrival to the plains forced the weakened Arikara to move up the Missouri River to near present day Bismarck, North Dakota. This new group was the Dakota or Sioux Indians (Schell, 1968, pp. 16-18).

The Sioux were driven from the Ohio River Valley by the more powerful Iroquois into Minnesota and Wisconsin. There they were forced west by the Chippewas who had guns obtained from the French, and the Sioux settled into eastern South Dakota. The Sioux came in a slow migration

rather than in a mass movement. They slowly drifted westward following the buffalo and reached the Coteau in the mid eighteenth century.

The "Seven Council Fires" or Dakota Nation represented seven tribal units speaking one basic language with three distinct dialect divisions. Dakota in their own language meant "friend." The word Sioux came from a French corruption of a Chippewa expression for "snake" or "enemy," although through time the word has lost its derogatory meaning (Schell, 1968 pp. 18-19).

Of the seven tribal units to move into South Dakota, the Yankton and Yanktonia settled on the Coteau du Missouri. But because they were nomads it is impossible to say they lived in any one part of the state as they moved about following wild game. While on the plains they obtained horses, increased their weaponry and broadened control of the land. The Sioux Indians ruled the Great Plains until the arrival of Europeans which led ultimately to their downfall.

American Occupance

Far to the east, out of the Sioux's, domain events were taking place which would have a great impact upon them. In 1762 the secret Treaty of Fountainbleau transferred the territory west of the Mississippi River

from France to Spain. At the time France was at war with England and was afraid of losing the Louisiana Territory. France was later able to regain possession of this territory from Spain through the Treaty of San Ildefonso in 1802. On 30 April, 1803 the United States bought the Louisiana Territory from Napoleon. At this time no consideration was given for the people who were already on the land. With this purchase the United States sought to explore and settle the land to secure it for their own (Karolevitz, 1975, pp. 18-24).

The first known white inhabitants to the region were fur trappers and traders. These men had occupied and, to a limited extent, explored the land even before it had become the property of the United States. It is thought that the first white man to enter present day South Dakota was Daniel Greysolon who did so in 1679. These first traders and trappers were concentrated along streams and rivers.

In 1800 Registre Loisel built Fort Aux Cedres which was on the western edge of the Coteau about 35 miles south of present day Fort Pierre. This was an important stop-over point for traders until it was destroyed by fire in 1810 (Karolevitz, 1975, p. 21). Most of the main trading posts were between Fort Pierre and Chamberlain. These were operated by the Hudson Bay

Company, Upper Missouri Outfit, and American Fur Company.

During the early 1800's much of the exploration of the region occurred. The Lewis and Clark expedition made contact with the Sioux along the Missouri River in 1804. Other ventures into the area explored the region and many of these were by the military. With this contact between the Indians and whites, tensions started to arise. The Indians viewed all this activity on their land with hostility. During the war of 1812 the British encouraged the Sioux to drive the Americans from the upper Missouri River Valley. The Santee and Yanktonians joined the British, while Manuel Lisa, an early trader, persuaded the Teton and Yankton to remain neutral (Schell, 1942, pp. 46-48).

During the mid 19th century there were few problems with the Sioux. The fur industry had died down because of a depressed market for furs in Europe, and exploration in the new land was largely over. This occurred prior to settlement by whites in South Dakota, which ultimately brought an almost endless supply of settlers into the territory. This settlement by whites led to much hostility between the Indians and whites.

In 1851 the Santee tribes agreed to give up land in eastern South Dakota in exchange for a reservation farther north along the Minnesota River. The Yankton

tribes agreed to give up lands during the summer of 1858 in exchange for a reservation of 400,000 acres in present day Charles Mix County. These two agreements opened land between the Missouri River and Minnesota to white settlement. While the Yanktonia left for their new home, settlers rushed in that same day 10 July, 1859 to take the vacated land. In the absence of any proclamation this may be regarded as the official opening of Dakota Territory (Schell, 1968, pp. 67-77).

In 1861 the Dakota Territory was created. The first capital of Dakota Territory was Yankton and William Jayne served as first Governor. President Lincoln appointed Jayne, who was the President's close friend and personal physician. Dakota Territory contained the future states of North Dakota, South Dakota, and Montana, and it contained 350,000 square miles.

Many of the first people into Dakota Territory were not settlers but land speculators whose only intent was to make money quickly. These speculators staked claims to the best lands and established townsites. Movement into the new land by settlers was slow at first. Settlement was hampered by Indian wars, the Civil War, an absence of a railroad, and crop failure (Shell, 1968, p. 80). Settlement in the Coteau lagged behind the rest of eastern South Dakota. This was because settlement

occurred in an east to west progression. Two railroads which crossed the Coteau and helped speed up this settlement during the 1880's were the Chicago and Northwestern Railway Company which went from Minnesota to Pierre and the Chicago, Milwaukee, and St. Paul Company which had tracks from Canton to Chamberlain (Schell, 1968, pp. 158-167).

Home Steading

The Homestead Act was passed 20 May, 1862. The legislation opened up Dakota Territory for settlement even though large scale settlement did not occur until later. The people who did homestead on the Coteau had a hard life ahead of them if they were going to "prove up" for their 160 acres. While there was limited settlement throughout the Coteau, the first area to have concentrated settlement was in Bon Homme County (Jennewein and Boorman, 1973, pp. 84-85).

The first settlers usually lived in a dug-out or a sod house, unless the homestead was in one of the few wooded areas in which a cabin could be built. Often these were shared with livestock in the winter to conserve heat. For fuel the pioneer depended on buffalo and cow chips, twisted hay and corncobs. Light was often provided by a rag burning in tallow (Schell, 1968, pp. 175-180).

The most important thing on these homesteads was a water supply. Usually a surface well was dug by hand, which was fifteen to twenty feet deep (Schell, 1968, p. 178), but some were lucky enough to live by a stream or spring. They also caught water in barrels, and melted snow.

Food that these pioneers ate was from gardens, livestock, and wild game. Women and children tended the garden which grew food that would keep through the winter such as potatoes, carrots, sweet corn, cucumbers, cabbages, and onions. Each family had a cow to supply them with milk. The milk was used for drinking, skimming of cream to make butter, and the making of cheese for the winter. Beef and pork were put in brine or dried. Eggs were greased and put into barrels of grain for winter when the chickens wouldn't lay (Jennewein and Boorman, 1973, pp. 80-81).

The pioneers grew their own wheat which was threshed and hauled to a mill in a nearby town where it was ground into flour. The women baked this flour into breads and other foods to eat. Some foods, like butter and eggs, were traded for items that couldn't be made like needles and thread, cloth, and shoes (Jennewein and Boorman, 1973, p. 81). The pioneers of the region existed on only the necessities of life. There was no luxury to the life

of the early pioneers.

Ethnic Origins

South Dakota is often referred to as the "Land of Infinite Variety." Not only does this refer to the physical features of the state, but also to the people as well. These individuals came from various European nations and the mixing of these people and their cultures has combined to produce an interesting group called South Dakotans.

South Dakota is one of the more recent areas of the United States to be settled. This late settlement can be attributed to aspects of its geography. Except for gold found in the Black Hills, the white man's interest in the region was fur trading, land speculation, and lastly agriculture and settlement.

The Germans comprise the largest and most diffused ethnic group of people in the state and in the Coteau (Figure 11). Their movement to the state was a slow continuous process spread over time, rather than their having arrived in groups. It is difficult to differentiate the Germans from other ethnic groups in the state who lived close to Germany, because those other groups are so closely related through boundary changes in the Old World (Jennewein and Boorman, 1973, p. 123).

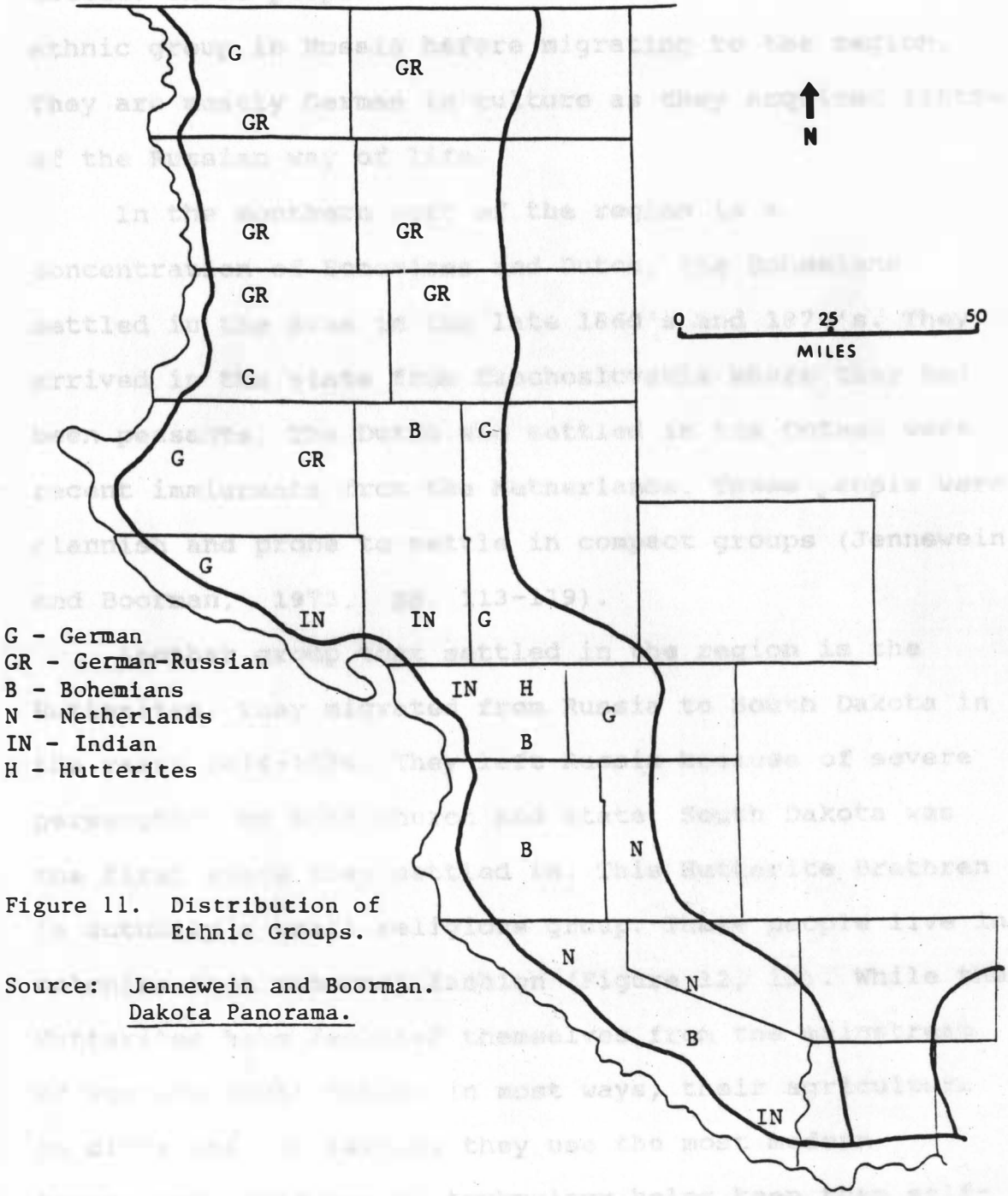


Figure 11. Distribution of Ethnic Groups.

Source: Jennewein and Boorman. Dakota Panorama.

German-Russians settled in the northern part of the Coteau. These people who are of German stock, were an ethnic group in Russia before migrating to the region. They are mostly German in culture as they acquired little of the Russian way of life.

In the southern part of the region is a concentration of Bohemians and Dutch. The Bohemians settled in the area in the late 1860's and 1870's. They arrived in the state from Czechoslovakia where they had been peasants. The Dutch who settled in the Coteau were recent immigrants from the Netherlands. These people were clannish and prone to settle in compact groups (Jennewein and Boorman, 1973, pp. 113-119).

Another group that settled in the region is the Hutterites. They migrated from Russia to South Dakota in the years 1874-1879. They left Russia because of severe persecution by both church and state. South Dakota was the first state they settled in. This Hutterite Brethren is actually a small religious group. These people live in colonies in a communal fashion (Figure 12, 13). While the Hutterites have isolated themselves from the mainstream of western civilization in most ways, their agriculture is different. In farming they use the most modern technology. This use of technology helps keep them self-sufficient, and also keeps down contacts with the outside

Figure 12. Millerdale Hutterite Colony Livestock Quarters.

Figure 13. Millerdale Hutterite Colony Living Quarters.

world (Riley, 1974, pp. 3-10).

The Hutterites refused to participate in any way in the war effort during World War I. Because of this, and their German background, strong sentiments developed against them during the war. As a result the Hutterites left for Canada. Later during the 1930's these people were asked to return to South Dakota to farm idle land (Riley, 1974, p. 5).

Other ethnic groups from Europe settled in the region, but did so in limited numbers. Of these other peoples Swedes and Irish make up the biggest portion, while other European heritages can be found in limited numbers. Also living in the region are some American Indians who live on the Crow Creek Indian Reservation which is located in southern Hughes and Hyde counties and western Buffalo County. Some Indians are also found in the southern portion of the Coteau.

The last years of the 1800's were marked with problems for farmers. After the "Dakota Boom" which lasted from 1878-1887 farm prices declined. Coupled with this was a drought lasting into the mid 1890's. Many of the people were hard pressed to continue living in the region (Schell, 1968, pp. 223-224).

Twentieth Century

At the turn of the century good weather, new railroad extensions, potential reservation openings to whites, and a more scientific approach to agriculture helped revive the state's growth pattern. From 1900 to 1910 the Coteau and South Dakota experienced one of the largest decades of population growth ever. This time of prosperity continued in the state for the first two decades.

With World War I imposing a demand for increased food production on the nation, farmers in South Dakota and the Coteau prospered. Prices for farm products increased and with land values rising the entire state experienced economic growth. South Dakota responded well to other war efforts. The state exceeded quotas in drives for funds for the Red Cross and other national welfare organizations (Schell, 1968, p. 270).

While the war brought prosperity to the state there was an unfortunate side as well for South Dakota citizens. More than 32,000 South Dakotans served in World War I. Altogether, 210 were killed in battle and about 100 more died from wounds. This caused much ill will against peoples of German ancestry which happened to be one of the largest ethnic groups in the Coteau

(Karolevitz, 1975, pp. 243-245).

When the war ended the demand for many farm products eased. Farmers were not only faced with low prices, but also a decline in land values. This caused many farms and banks to fail in the 1920's. Coupled with the "Great Depression" of the 1930's and the Dust Bowl this was an extremely trying time for the region (Schell, 1968, pp. 277-284).

After the depression economic recovery was experienced during World War II and afterwards. Once again prices were good and farmers were able to reduce indebtedness and build up financial reserves. This prosperity spilled over to the towns of the region too. Rural areas were able to get electricity, telephone service, and improved transportation facilities making for a better life. Unfortunately 2,044 South Dakotans died in World War II (Schell, 1968, pp. 299-304).

Continuing to the present, residents of the Coteau have experienced good and bad economic times. While the population has declined in the region, productivity has grown. Technology has advanced allowing for a better, easier life for the people who inhabit the Coteau du Missouri.

CHAPTER IV

CULTURAL ENVIRONMENT

The cultural environment is extremely important in a regional study. It reflects how man has used the elements that nature has provided to meet his needs. To understand past and present influences of the area's residents, the region's agriculture, mining, industry, transportation, population, and power and utilities need to be examined. In the understanding of these items, one can draw conclusions about the future of that region.

Agriculture

Agriculture is the life blood of the Coteau du Missouri. It is the most important industry found in the region. From a subsistence level of farming in the beginning, to the major agri-business it has become today, the Coteau has depended on agriculture for its livelihood. Because of agriculture's importance to the region, its success will be of major importance to the Coteau for many years to come. Most of the land in the region is used for crop production and for raising livestock.

Earliest attempts at raising crops by white settlers were in the southeastern part of the state. The settlers

of the 1860's raised a variety of crops to provide for themselves. This farming was on a small scale. In the 1880's the coming of the railroads prompted settlers to produce more small grains, which was mainly wheat. The railroad provided a means of shipping this grain to market. Many people thought that corn could not be raised because of the short growing season and the dry climate, but successful corn crops prompted more of this crop to be grown.

Early explorers and military leaders declared the upper Missouri Valley to be unfit for cultivation, thus making it uninhabitable by white men. Their reports built up the myth of the "Great American Desert" with the entire state of South Dakota located entirely within this region. Settlement was discouraged as being haphazardous and experimental (Schell, 1968, p. 13).

When settlers were able to raise crops in the supposedly uninhabitable region, and the region was found to have adequate rainfall for many agricultural endeavors, the myth of the region being a desert was dispelled. Some people thought cultivation of the soil had increased evaporation enough to modify the temperature and to cause increased precipitation. This caused settlers during the late 1870's and early 1880's in eastern South Dakota to think that "rainfall follows

the plow." When disastrous droughts returned it caused many to reevaluate their thoughts on South Dakota's climatic conditions (Schell, 1968, pp. 13-14).

These periods of recurrent drought, which occur in approximately twenty year cycles, and adequate rainfall have continued to the present. The most severe drought occurred during the 1930's in the midst of the Great Depression. These droughts cause many problems for farmers in the Coteau, but when rainfall returns to normal they are able to raise good crops.

Because of these periodic droughts, research continues to be conducted to find crops and grasses which are more resistant to drought. Various crop types have been brought into the region from other areas, and these are better able to withstand the changing weather conditions.

Farmers shifted from use of horses to tractors during the 1920's. This switch to mechanized farm equipment added tremendously to the acreage under cultivation, as well as decreasing man hours needed. Farmers had more crops to sell even though yield per acre declined because less productive land was being farmed. With the introduction of hybrid crops to the region yields increased.

When the United States became involved in World War

I and World War II there was an increased demand for agricultural production. Farmers responded to this by increasing farmland acres. With this increased demand for food farmers were able to increase profits. This allowed them to use more modern farming techniques and machinery which improved their productivity in the region.

The raising of livestock was an important part of agriculture on the Coteau. Its importance has lessoned in the region with increased crop production and the dependence on the government farm program. Some farms have vast acreages with no livestock on them (Figure 14). Even so livestock and livestock products produce more income in the Coteau than do grain and cash crops. Income statistics however can be misleading as many of the livestock and livestock products are the result of the use of grains and cash crops that would otherwise have been sold.

Among agricultural states South Dakota ranks high in production of crops and livestock. It ranks near the top in production of oats, rye, flax, sunflower seed, and sheep production (SDASS, 1987-1988, p. 4). Sales of farm products in 1986 accounted for $2.463 billion in farm income; of this sale of livestock and livestock products accounted for 53.6 percent, crops accounted for 32.9 percent, with the remaining 13.5 percent from government

Figure 14. Grain Storage.

payments (SDASS, 1987-1988, p. 65).

The largest portion of the government payments are paid to wheat and feed grain growers. A limited amount goes to wool producers, conservation programs and various miscellaneous programs. Total government payments to South Dakota farmers were $383 million in 1986. The importance of these payments is increasing to farmers as they are becoming a larger percent of the farmers' total income. The 1982-1986 average was 8.2 percent of total income (SDASS, 1987-1988, p. 65). Given the extent of the farmers dependence upon government, the conduct of agricultural policy will continue to be an extremely critical determinant of income, output and employment in the Coteau's agricultural economy. This is because agriculture policy is partially responsible for determining the profitability of certain production choices and therefore the amount of income available to farmers (Lang, 1972, pp. 24-33).

Farm sizes in the Coteau vary from an average of 380 acres in Bon Homme County to 3,257 acres in Buffalo County (Table 3). The average farm size in South Dakota is 1,271 acres which is an increase from 781 acres in 1960. The number of farms statewide has decreased from 58,400 in 1960 to 35,000 today (SDASS, 1987-1988, p. 65). While these figures are based on a statewide

Table 3

County	No. of farms, 1959	Average farm size, 1959	No. of farms, 1982	Average farm size, 1982	Total cropland
Aurora	728	585*	480	790*	250,799*
Bon Homme	1273	277	826	380	256,089
Brule	620	819	441	1,016	249,047
Buffalo	141	2142	94	3,257	68,092
Campbell	571	850	358	1,228	249,717
Charles Mix	1426	482	884	727	421,712
Douglas	821	3477	509	514	211,363
Edmunds	791	882	520	1,232	435,803
Faulk	602	1005	368	1,577	357,704
Hand	962	947	630	1,375	489,732
Hughes	313	1447	252	1,453	NA
Hutchinson	1585	327	1,064	463	409,356
Hyde	325	1591	237	2,297	179,918
Jerauld	551	576	315	959	161,269
McPherson	911	779	482	1,265	338,523
Potter	465	1192	341	1,587	347,428
Sully	381	1729	279	2,198	417,515
Walworth	509	926	405	1,041	267,422

*In acres

Source: Agricultural Experiment Station, South Dakota Statistics At A Glance, 1984.

U.S. Department of Commerce. U.S. Census of Agriculture. South Dakota. Counties. 1959.

average, they are indicative of the trend found in the Coteau du Missouri where the number of farms is decreasing.

Real estate value in the state has increased from $13 per acre in 1940 to a high of $349 per acre in 1982. Since then land value has declined to $178 per acre in 1987. The average value per operation unit decreased from $418,500 in 1982 to $220,584 in 1987 (SDASS, 1987-1988, p. 73). These again, are statewide statistics but do reflect the trend of declining land values in the Coteau. This declining of real estate value has caused problems for farmers in the region, as has been seen by the author, who had a debt based on the higher value. Many farmers in the Coteau have encountered great difficulty with lending institutions because of this deflation of land value.

Crop production figures for the Coteau du Missouri will be presented in the following table and maps (Table 4, Figures 15-19). Wheat is the most important cash crop in the northern counties of the region while corn is more important in the south. The most recent data available for agricultural production are from the South Dakota Agricultural Statistics Service 1987-1988. The extreme southwest corner of Beadle County is included in the Coteau but production figures will not be included, as

Table 4

Production of Major Crops in the Coteau du Missouri

	Acres planted	bu/acre	Total yield bu.
Oats	453,000	41.0	15,767,900
Barley	297,500	36.3	10,266,200
Corn	863,300	64.6	49,162,500
Wheat	1,127,500	28.5	27,690,200
Sunflowers	136,000	1290*	173,700,000*

*in pounds.

Source: South Dakota Agricultural Statistics, 1987-1988.

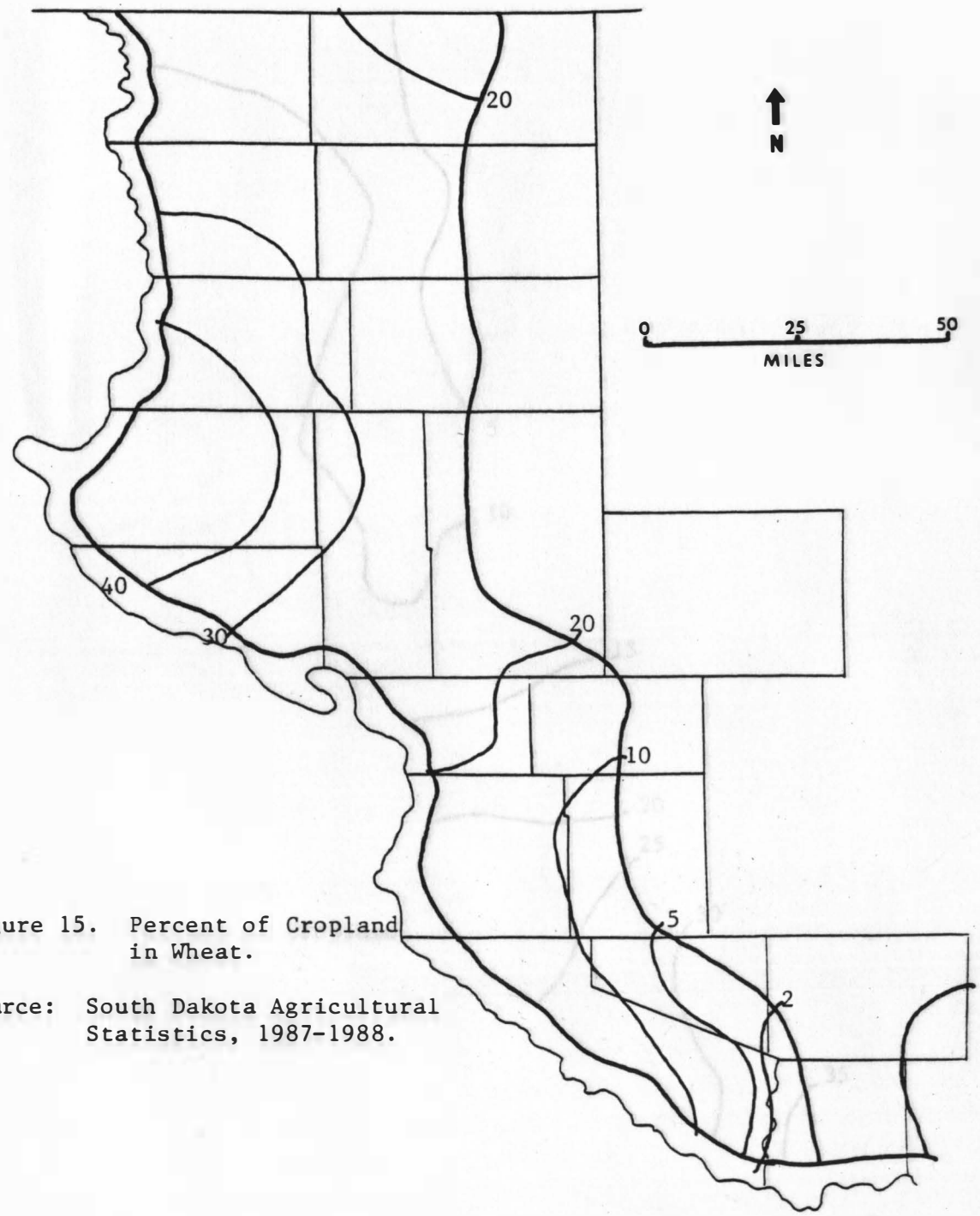


Figure 15. Percent of Cropland in Wheat.

Source: South Dakota Agricultural Statistics, 1987-1988.

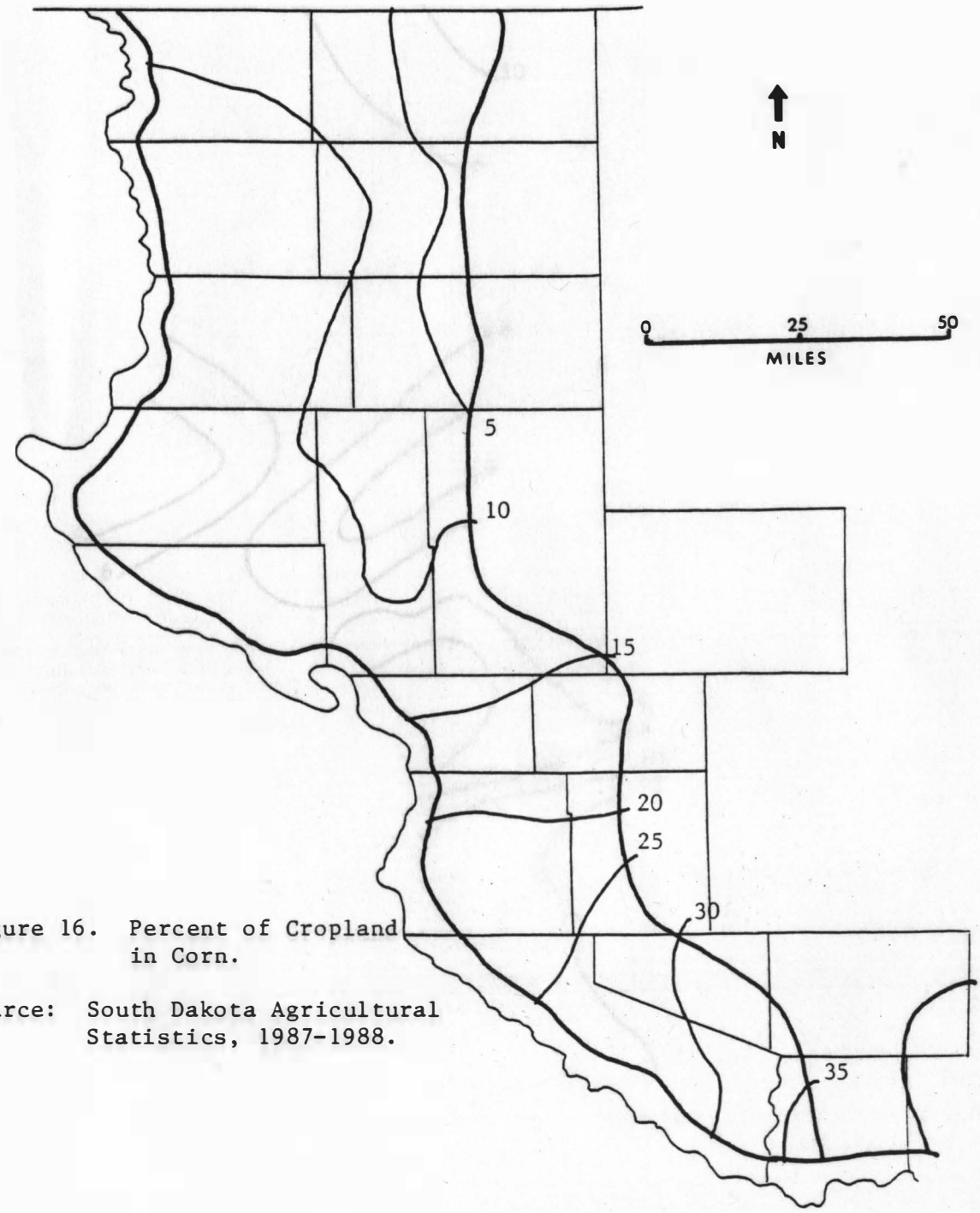


Figure 16. Percent of Cropland in Corn.

Source: South Dakota Agricultural Statistics, 1987-1988.

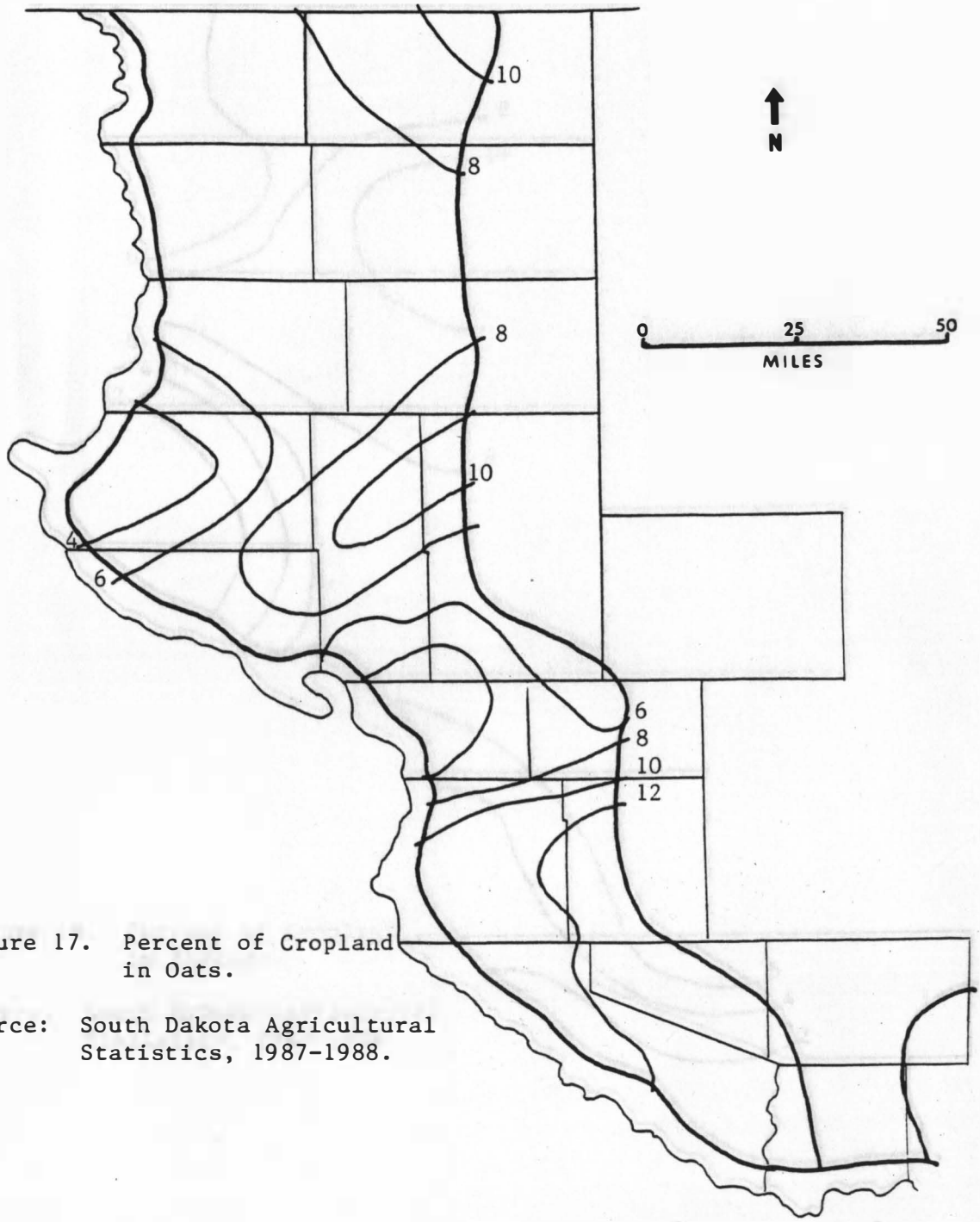


Figure 17. Percent of Cropland in Oats.

Source: South Dakota Agricultural Statistics, 1987-1988.

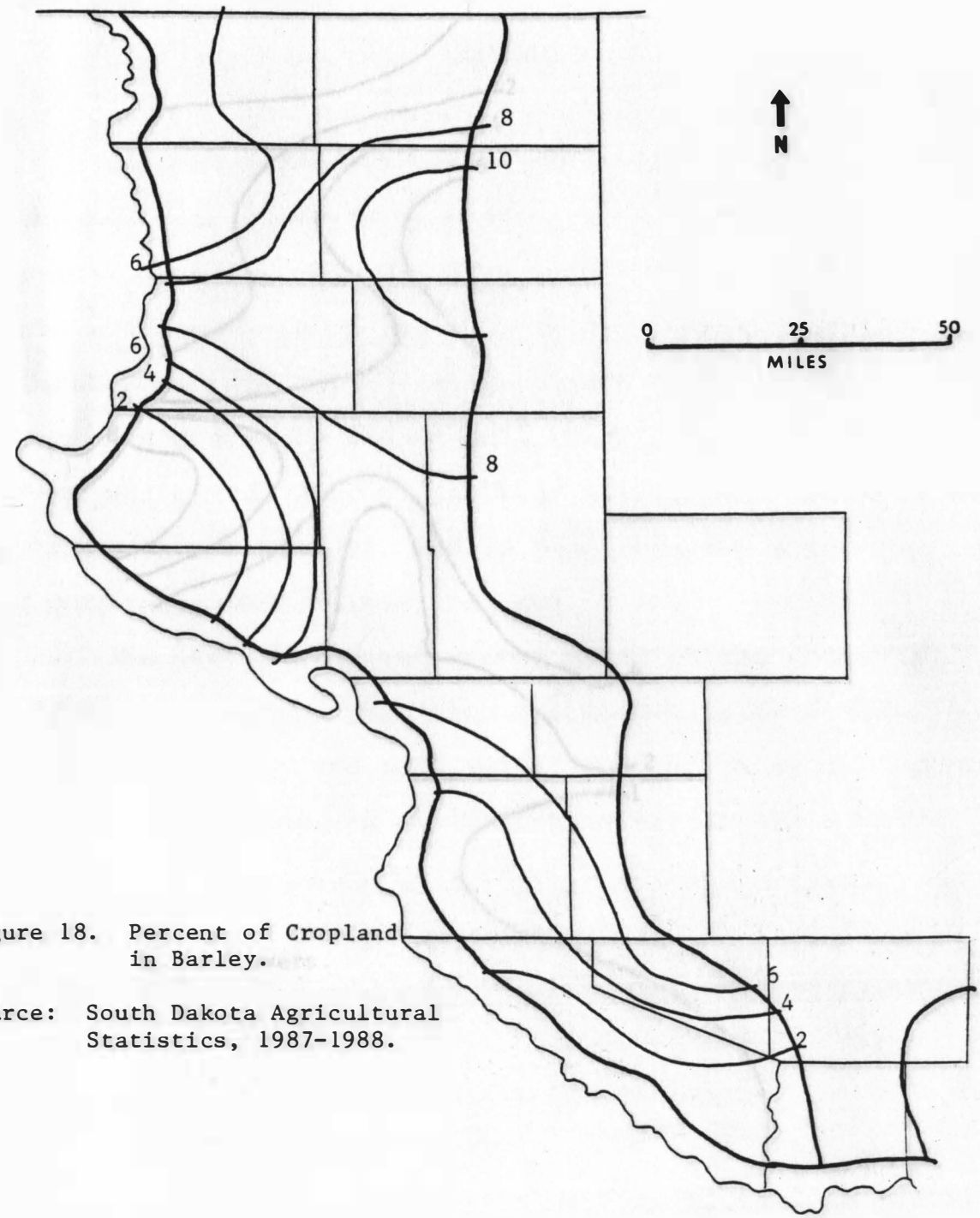


Figure 18. Percent of Cropland in Barley.

Source: South Dakota Agricultural Statistics, 1987-1988.

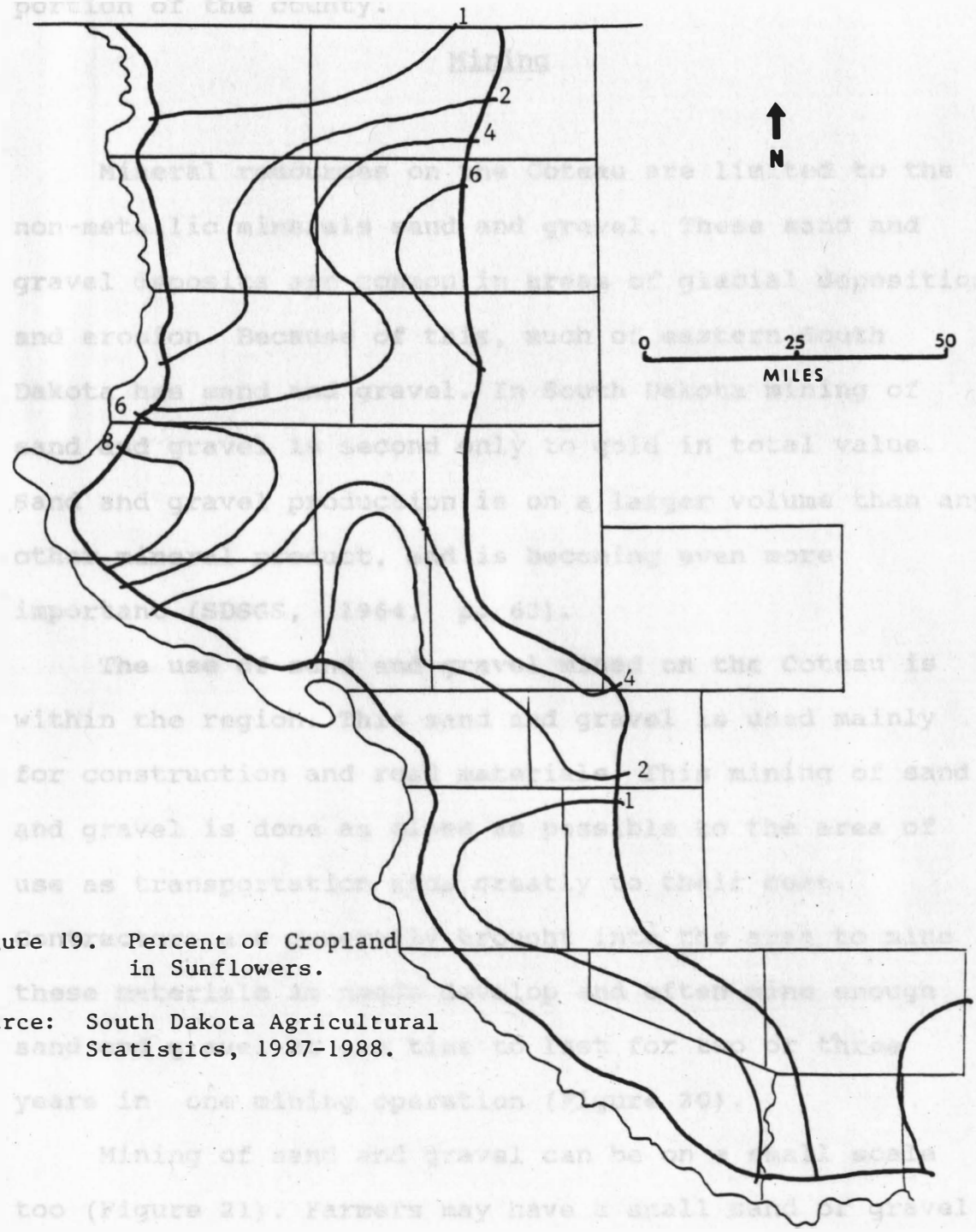


Figure 19. Percent of Cropland in Sunflowers.

Source: South Dakota Agricultural Statistics, 1987-1988.

these statistics would not be accurate for such a small portion of the county.

Mining

Mineral resources on the Coteau are limited to the non-metallic minerals sand and gravel. These sand and gravel deposits are common in areas of glacial deposition and erosion. Because of this, much of eastern South Dakota has sand and gravel. In South Dakota mining of sand and gravel is second only to gold in total value. Sand and gravel production is on a larger volume than any other mineral product, and is becoming even more important (SDSGS, 1964, p. 63).

The use of sand and gravel mined on the Coteau is within the region. This sand and gravel is used mainly for construction and road materials. This mining of sand and gravel is done as close as possible to the area of use as transportation adds greatly to their cost. Contractors are generally brought into the area to mine these materials as needs develop and often mine enough sand and gravel at one time to last for two or three years in one mining operation (Figure 20).

Mining of sand and gravel can be on a small scale too (Figure 21). Farmers may have a small sand or gravel pit, or an abandoned one after its commercial value has

Figure 20. Gravel Operation near Polo, South Dakota.

Figure 21. Tractor and Scraper.

ended, on their farm for their own use. Often the quality of sand and gravel is poor and not suitable for commercial purposes.

Industry and Commerce

Industry located in the Coteau du Missouri is related to several factors. Paramount among these factors are agricultural production, population, natural resources, transportation, and power and utilities. While agriculture is the most important economic activity in the region, there are other industries located there, but on a more limited scale. These industries are hampered by the low population and the remoteness of the area. Other than the retailing of goods and services in the lcoal towns, industries existing in the region are mostly processing facilities for agricultural products. The most common agricultural processing facilities are grain elevators. These are mainly for storage. Major elevator facilities are located along the railroad lines. Types of commerce, in addition to the grain elevators, found on the Coteau that serve farmers include livestock sale barns, implement dealers, seed companies, and chemical dealers. Other industries located in the region include newspaper publishers, banking, grocery stores, hardware stores, and meat processing (Table 5). These serve the

Table 5

Industry in the Coteau du Missouri

ARMOUR
Armour Chronicle
Kingswood Mink Ranch Inc.
Morrow Produce
Rocket Printing, Inc.
Shanard, Inc.

AVON
Avon Enterprises, Inc.

BOWDLE
Bowdle Creamery Company, Inc.
The Bowdle Pioneer

CORSICA
Corsica Cheese, Inc.
Farm Aid Manufacturing
Star Manufacturing Company
The Corsica Globe

DELMONT
Blue Bird Locker
Delmont Record
Semmler Produce

EUREKA
Eureka Cheese, Inc.
Eureka Equity Exchange
Eureka Ready Mix
Kauk's Meat Market
Schaeffer's Manufacturing, Inc.
The Northwest Blade, Inc.
Wolff Company, Inc.

FAULKTON
Builders Cashway of Faulkton
Classic Vans
Moritz Publishing Inc.

GANN VALLEY
Koch Manufacturing Co.

GEDDES
Boyd's Gun Repair
Charles Mix County News
Ladd Distributing, Inc.

GETTYSBURG
C C - Feed and Grain Company
Gettysburg Concrete & Materials
Lake Processing
Oahe Publishing Corporation

HARROLD
Mascher Farm & Ranch

HERREID
Herreid Concrete

HIGHMORE
Highmore Herald
Wilson Redi-Mix, Inc.

HOVEN
Blue Valley Dairy
Chuck's Plastics
Hoven Dairy Corporation

KIMBALL
C.C. Natvig's Sons, Inc.
Fatland Honey Co.

LAKE ANDES
J & R Miller Enterprises

LONGLAKE
L & L Meat Market, Inc.
Long Lake Industries, Inc.

ONIDA
Onida Watchman
Tom's Meat

PLATTE
Crosby's Saddle Repair
Platte Ready - Mix
The Platte Enterprise

REE HEIGHTS
Ree Heights Review

ROSCOE
Meier Clock Shop

SELBY
Selby Record
Smith Red Barn, Inc.

SENECA
Al's Produce

STICKNEY
Argus Printers

TOLSTOY
Tolstoy Grocery

WAGNER
Jussel Construction
Wagner Post & Advertizer

WESSINGTON SPRINGS
Crist Products
True Dakotan

Source: South Dakota Manufacturers and Processers Directory, 1986.

needs of both rural and urban residents of the Coteau.

Towns in the Coteau which provide the bulk of services available to the region are Eureka, Gettysburg, Platte, Roscoe, Wagner, and Wessington Springs. These towns have a greater number of businesses and industries than do smaller towns in the region, and provide better shopping and services for the residents of the Coteau. These towns all have populations of over 1,000 people and are located throughout the region. Industries located in the region are usually locally owned, small town businesses that employ several workers and provide products for the immediate area (Figure 22). These industries serve the community in a valuable, but limited way. Many of the smaller towns are served by only a gas station, small grocery store, and grain elevator. These towns are minimum service centers and have populations of 300 or less. They only provide for limited needs of the townspeople and for farmers of the immediate area.

If residents of the region have specific needs that cannot be served by the industries found on the Coteau du Missouri they must go to the larger towns near the region. These are Aberdeen in the north, Pierre in the central part, and Mitchell in the south.

Figure 22. Koch Manufacturing Company.

Transportation

South Dakotans are an extremely mobile people. This is necessary because the state has a low population density which is fairly evenly distributed. The population is so widely distributed because of its dependence on agriculture, which is the main determining factor in the state's heavy use of transportation. Agriculture also influences transportation systems as there is a concentration of roads in the more densely populated areas of the region.

The use of automobile travel and truck transport are the core of South Dakota's transportation system and important to its economy. Even the use of the rail system is based on truck transport of commodities to rail terminals. Because of this tremendous dependence on highway transportation the state's per capita expenditures on roads and highways are among the highest in the nation (BIR, 1982, p. 132). The major highways which provide transportation on the Coteau are both state and federal (Figure 23). One of South Dakota's two Interstate highway systems passes through the Coteau, this is I-90.

Railroads were an extremely important factor in the settlement of the Coteau. Many of the towns were a

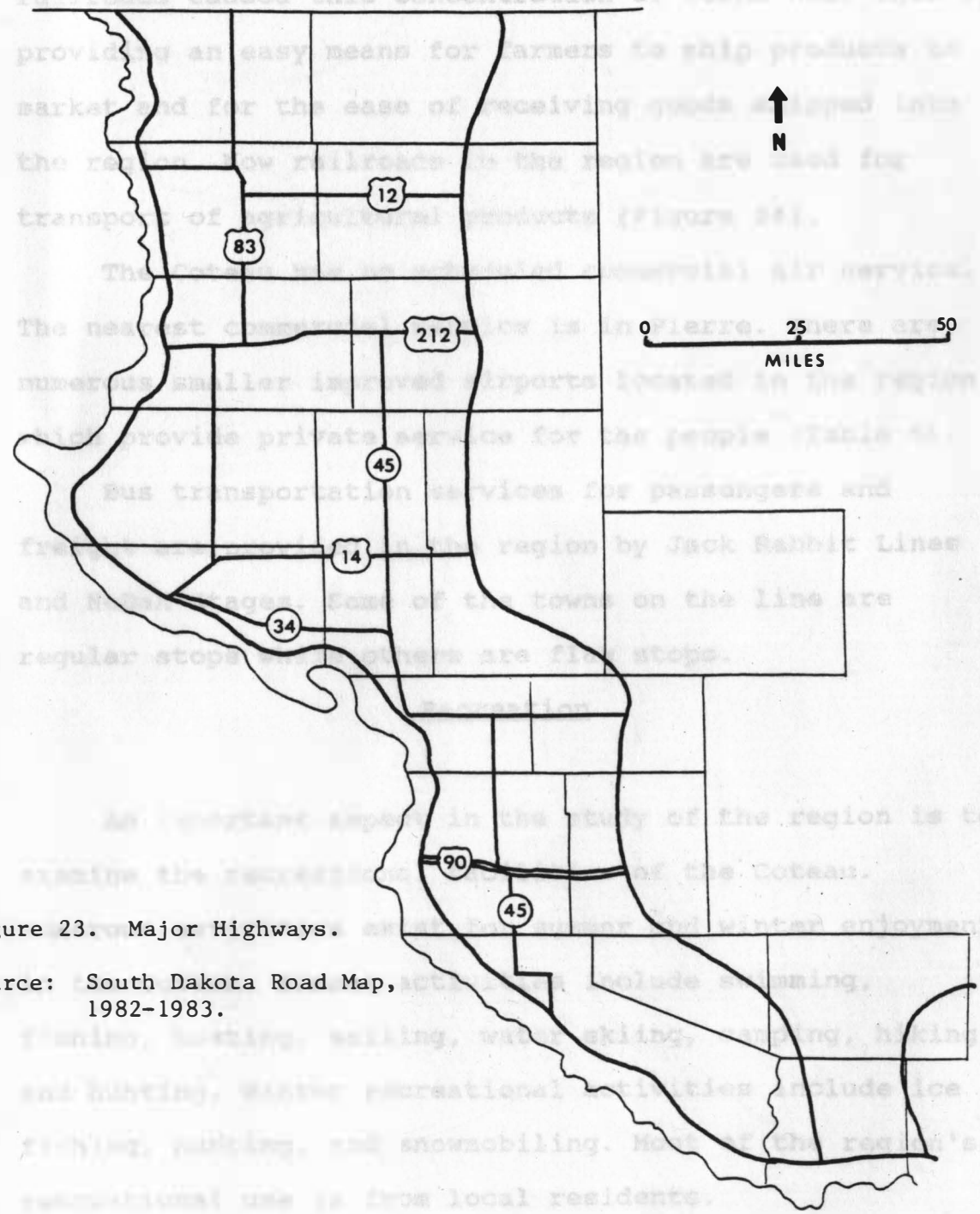


Figure 23. Major Highways.

Source: South Dakota Road Map, 1982-1983.

product of these railroads passing through the area. The railroads caused this concentration of towns near them by providing an easy means for farmers to ship products to market and for the ease of receiving goods shipped into the region. Now railroads in the region are used for transport of agricultural products (Figure 24).

The Coteau has no scheduled commercial air service. The nearest commercial service is in Pierre. There are numerous smaller improved airports located in the region which provide private service for the people (Table 6).

Bus transportation services for passengers and freight are provided in the region by Jack Rabbit Lines and NoDak Stages. Some of the towns on the line are regular stops while others are flag stops.

Recreation

An important aspect in the study of the region is to examine the recreational facilities of the Coteau. Numerous activities exist for summer and winter enjoyment in the Coteau. Summer activities include swimming, fishing, boating, sailing, water skiing, camping, hiking, and hunting. Winter recreational activities include ice fishing, hunting, and snowmobiling. Most of the region's recreational use is from local residents.

Since no rivers or major streams cross the region,

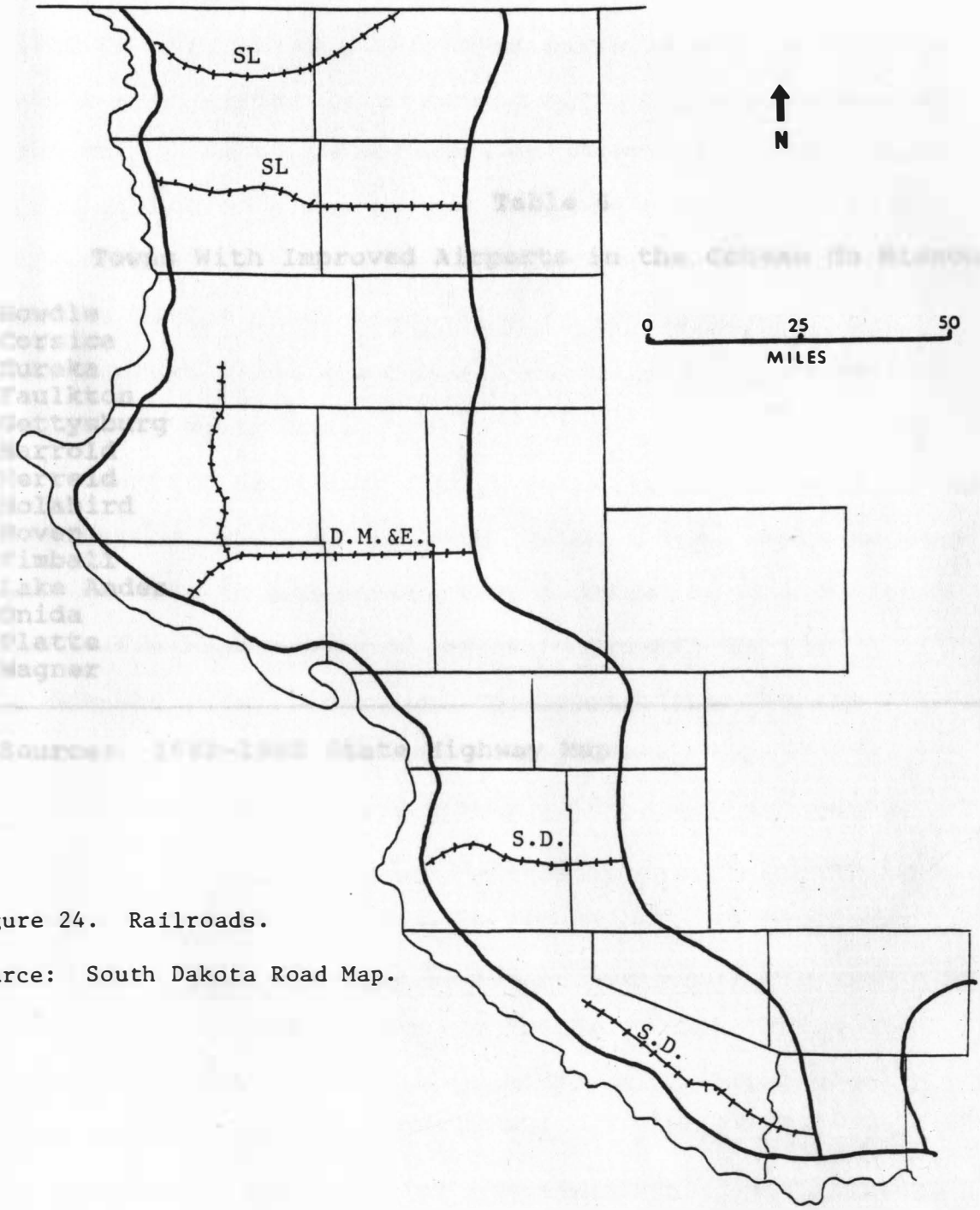


Figure 24. Railroads.

Source: South Dakota Road Map.

Table 6

Towns With Improved Airports in the Coteau du Missouri

Bowdle
Corsica
Eureka
Faulkton
Gettysburg
Harrold
Herreid
Holabird
Hoven
Kimball
Lake Andes
Onida
Platte
Wagner

Source: 1982-1983 State Highway Map.

water recreation is limited to lakes. Some lakes have facilities built for boating, swimming, and camping (Figure 25), while other lakes serve mainly as fishing areas with virtually no development of their recreational potential. Major lakes which are developed usually have a good growth of trees around them which is pleasant for hiking and for observing the wildlife of the area. Lakes in the region which have parks or recreational development include Molstad Lake, Lake Andes, Platte Lake, and White Lake.

Hunting is a very important recreational activity in the region. Pheasant hunting in the Coteau ranks as some of the best in the state. Many counties of the region have very high potential carrying capacities for pheasants (OEM, 1976, p. 34). These counties are located in the central and southern counties of the Coteau. The area around Platte in Charles Mix County annually provides excellent hunting. Not only does this provide excellent hunting to residents, but many non-residents enjoy hunting in the Coteau also. Deer hunting is a very important activity in the region. In recent years deer numbers have been abundant allowing good hunting for residents of the Coteau, surrounding people of the state, and even for non-residents. Some antelope are hunted in the region.

Figure 25. Rose Hill Access Area.

Waterfowl hunting is popular in the fall. Most of the ducks and geese found in the region are migrating south for the winter and have stopped to rest and feed. The hunting is particularly important near the Missouri River where commercial hunting takes place.

Use of motorized vehicles is increasing for recreational purposes. These include motorcycles, three wheeled vehicles, and snowmobiles. They provide summer and winter enjoyment, and also have some value for helping with various odd jobs on the many farms of the region.

It is estimated that visitors spend $208 million each year in their travels throughout the State (Madden, 1986, p. V). The Coteau du Missouri receives only a small portion of this which is mainly from lodging, eating, and automative services as many of the tourists are traveling through the region to better known recreational areas of the state. This is important because it represents money that is brought into the region that was earned elsewhere. Residents of the Coteau du Missouri need to provide good recreational facilities for these people so they will return, and so others will come too.

With an increase in people's leisure time they spend more time doing things they enjoy. The region needs to

cater to these residents and non-residents by maintaining recreational facilities, and to improve the underdeveloped facilities.

Power and Utilities

Electric power in the Coteau is provided by several sources. The southern half of the region is supplied by East River Electric Power Cooperative. The north portion of the Coteau receives electricity from Rushmore Electric Power Cooperative in the counties along the Missouri River, while the other areas in the north are not members of a power supplier and purchase power individually (SDREA, 1975-1976, pp. 96-97). Northwestern Public Service Company provides electric power to towns throughout the region.

Telephone service is provided by various companies. The northern telephone services are associated with Northwestern Bell, while the southern portion is served by Midstate Telephone Company which is an independent cooperative (SDREA, 1975-76, pp. 150-153).

Natural gas is not available in the region. Propane gas is available and supplied by numerous cooperative and private businesses.

Population

The population of South Dakota historically has been rural. Recently, however, there has been a shift with rural population decreasing and urban population increasing. Several factors which have contributed to this trend of declining rural population include improved agricultural practices, an increase in farm size, improvements in farm machinery, and an increase in productivity.

Originally town location was related to the distribution of railroads in the region. Towns were located close to railroad tracks for convenience of access for trade and services to the settlers (Visher, 1918, pp. 111-112). Town size within the Coteau du Missouri ranges from Gettysburg with a population of 1,680 to Hillsview with a population of 7 (Table 7). Of the 47 towns in the region only six have a population of 1,000 or more, and 13 have a population of 100 or less (Figure 26).

While the state's population is increasing the population of the Coteau is becoming more rural (Table 8). Many of the people leaving are migrating to the larger towns within the state in search of better economic opportunity. From 1980 to 1986 all but three

Table 7

Cities and Towns of the Coteau du Missouri

Town	Population	Town	Population
Agar	130	Lake Andes	860
Akaska	60	Lebanon	140
Armour	690	Long Lake	100
Artas	40	Lowry	20
Avon	480	Loyalton*	10
Blunt	410	Mound City	110
Bowdle	640	New Holland*	120
Corsica	540	Onaka	50
Dante	90	Onida	760
Delmont	370	Plankinton	570
Eureka	1,180	Platte	1,260
Faulkton	930	Pukwana	220
Gann Valley*	100	Ravina	80
Geddes	260	Ree Heights	70
Gettysburg	1,680	Roscoe	1,020
Harrison*	80	Selby	780
Harrold	200	Seneca	100
Herreid	580	Stickney	350
Highmore	860	Tolstoy	80
Hillsview	7	Wagner	1,290
Holabird*	30	Wessington Springs	1,050
Hosmer	340	White Lake	370
Hoven	630		
Java	200		
Kimball	810		

Source: U.S. Bureau of the Census, West North Central - 1986 Population and 1985 Per Capita Income Estimates for Counties and Incorporated Places, Washington, D.C., 1988.

*Source:South Dakota State Highway Map.

Figure 26. Gann Valley, South Dakota.

Table 8

County Populations in the Coteau du Missouri

	1920	1980	1986	% change from 80-86
Aurora	7,246	3,628	3,336	-8.05
Bon Homme	11,940	8,059	6,770	-15.99
Brule	7,141	5,245	5,492	4.71
Buffalo	1,715	1,795	1,632	-9.08
Campbell	5,305	2,243	2,215	-1.25
Charles Mix	16,256	9,680	9,392	-2.98
Douglas	6,993	4,181	3,962	-5.24
Edmunds	8,336	5,159	4,960	-3.86
Faulk	6,442	3,327	3,077	-7.51
Hand	8,778	4,948	4,654	-5.94
Hughes	5,711	14,220	14,889	4.70
Hutchinson	13,475	9,350	8,654	-7.44
Hyde	3,315	2,069	1,913	-7.54
Jerauld	6,338	2,929	2,804	-4.27
McPherson	7,705	4,027	3,674	-9.44
Potter	4,382	3,674	3,674	NC
Sully	2,831	1,990	1,923	-3.37
Walworth	8,447	7,011	6,714	-4.24

Source: Satterlee and Arwood. County Populations - Statehood To Present.

counties of the Coteau experienced population declines. Within the state seven of the top eight counties experiencing population loss as a percentage of total population were in the region, while three counties ranked high in actual numbers lost (Table 9). The only two counties to gain population were Brule and Hughes.

The small towns in the region serve as minimum convenience centers. They offer such retail businesses as cafes, banks, grocery stores, service stations, post offices, and bars. In larger towns of the area grain elevators, hardware stores, implement dealers, pharmacies, variety stores, and automobile dealers are found. The larger towns and cities of the State which are found outside the region provide more services and a better selection of goods. These larger towns and cities are readily accessible to residents of the study area.

Towns and farms in the Coteau suffer from the out migration of people. This emigration from the region, especially the young people, is the result of a lack of jobs and economic opportunity in the area. This population loss is not good for the Coteau in several ways. A low population makes it difficult to attract business and industry to the region. Small businesses lose customers which decreases the volume of sales taking place, thereby making it harder to compete against

Table 9

Population Loss in the Coteau du Missouri

County Population Decline

TOP 10 LOSERS IN ACTUAL NUMBERS 1980-1986

Bon Homme	1,289**
Beadle	900
Clay	885
Hutchinson	696**
Fall River	688
Turner	564
Todd	486
Union	470
McPherson	380**
Marshall	372

** Counties in the Coteau du Missouri.

Source: Agricultural Experiment Station, 1986 Population Estimates.

County Population Decline

TOP 10 LOSERS BY % CHANGE 1980-1986

Bon Homme	-15.99**
McPherson	- 9.44**
Buffalo	- 9.08**
Fall River	- 8.15
Aurora	- 8.05**
Hyde	- 7.54**
Faulk	- 7.51**
Hutchinson	- 7.44**
Miner	- 7.27
Marshall	- 6.88

**Counties in the Coteau du Missouri.

Source: Agricultural Experiment Station. 1986 Population Estimates.

outside consumer markets. Many of the people who leave are the more highly educated individuals, which produces a brain drain for the area. This loss of young people also reduces the chance for population growth in future years as the individuals who would have babies are gone.

CHAPTER V

CONCLUSION

The tremendous diversity of South Dakota is reflected in its being called the "Land of Infinite Variety." From the physical features to the cultural elements, South Dakota is a unique place. The Coteau du Missouri is one of thirteen physiographic regions of South Dakota.

The Coteau's geology was influenced by the actions of glaciation, especially the Wisconsin glacial period. This glacial action had a leveling effect on the region as hills were leveled off and valleys were filled in producing less relief in many areas. This glacial action deposited the parent material which, when combined with climate, biological activity, time, and topography, produced the soil profile. This soil is highly fertile which makes the Coteau a productive agricultural region when there is adequate rainfall.

The region lies in an area with three climate types. These have winter average temperatures ranging from 13 to 26 degrees fahrenheit and summer temperature averages ranging from 65 to 75 degrees fahrenheit. Average annual precipitation is about 22 inches in the south to about 18 inches in the north, with approximately three-quarters of

it falling during the growing season.

The natural vegetation of the Coteau includes mid and tall grasses, mid and short grasses, and short and mid grasses. The dominant grass varieties included western wheatgrass, porcupine grass, buffalograss, bluegrama, and little bluestem. These grasses have largely been eliminated by agricultural practices and have been replaced with crops or less desirable grasses.

The impact of human occupancy in the Coteau has had an impact on the animal life. Buffalo and elk were eliminated while antelope exist but in very limited numbers. Other large mammals have adapted to humans and live in greater numbers. Many smaller mammals exist and these include rabbits, pocket gophers, mice, and shrews. Birds found in the region are very important to the farmer as they eat weed seeds and many insects which helps improve crop yields. Furbearers in the region not only provide recreation but produce income.

The lack of adequate water in the Coteau is a problem for people inhabiting the study area. This limits crop yields in the region and can have a devastating effect on the economy. Measures have been taken to preserve this limited resource by building dams and digging dugouts. Even so it seems that water is always in short supply in the region.

Human settlement started with nomadic Indians. These nomads occupied the region longer than any other people. They were replaced by the Mound Builders, then pre-Arikara, and finally Arikara who lived there until they were pushed out by the Sioux Indian nation which migrated to the Coteau from the Ohio River Valley. During the occupation by the Mound Builders through the Sioux Indians the first white men, who were trappers and traders, entered the area. The early 1800's were when much white exploration occurred. Settlement by whites did not occur until the mid to late 1800's. This settlement by whites caused many problems between the Indians and whites. When peace was restored the Indians were confined to reservations and whites had control over the rest of the state. The introduction of the railroad brought rapid settlement, and provided a means to ship goods to market. The white settlers experienced periods of prosperity and depression. These usually coincided with droughts in the region.

The most important economic activity in the Coteau is agriculture. This enterprise is dependent upon adequate moisture and good prices for products. Improvements in plant types, farm machinery, and farming practices have increased agriculture production on the Coteau. Agriculture is divided between livestock

production and grain farming. Sales of livestock products account for the biggest share of income. Government payments are becoming more important to farmers, and it appears they will become even more important in the future. While most of these payments go to grain farmers they have an impact on livestock production in the region. As agriculture has become more technological, the number of farms has decreased as farm size has grown. This change has an affect on towns of the region. As the number of farmers and farm workers decrease, the towns which depend on agriculture lose population, unless these towns can attract other business or industry.

Manufacturing in the region is limited to mainly farm related industries. While these industries are generally small, locally owned businesses they play an integral part in the business operations and day to day life in the region.

Mineral resources are limited to non-metallic minerals. Sand and gravel are found in abundant quantities in this glacial drift region and are used locally. In this glacial drift aquifer water is found and used by residents of the region.

The Coteau du Missouri is a rural area with a low population density which depends heavily on transportation. Not only does this transportation allow

for an extremely mobile population, it is how agricultural products are shipped to market. Railroads played an important part in the settlement of the region. People settled near these lines which provided a means of getting goods into the area and shipping farm products to market.

To a population with an increasing amount of leisure time recreation is very important. Much of the recreation is associated with lakes of the region. Swimming, fishing, boating, and camping are some of the main summer activities, while hunting is a popular fall and winter activity. More development of the recreational facilities needs to be done to serve a society which is becoming increasingly recreational.

Power and utilities are provided to residents of the region by several sources. Telephone service is provided by Northwestern Bell in the north and by an independent cooperative in the south.

The Coteau is a rural region, and the people are the region's most important resource. Many of the towns have low populations which causes the younger people to leave the region in search of better economic opportunity. This loss of population harms the area by making it an even increasingly rural area.

Future

The Coteau du Missouri should experience little change in the near future. A lack of adequate jobs and economic opportunity means young people will continue to leave the region. This means agriculture will continue to be the main economic activity in the study area. Industrial development, which depends on an adequate work force, probably will not take place. Instead small businesses which serve a farm oriented community will continue to be the primary industry. Recreation is one area where facilities could be improved and better services provided for the people who use them. The ruralness of the Coteau will continue to be highly evident in the future.

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